CLINICAL CORRELATION OF ARTICULAR DISC MORPHOLOGY AND POSITION IN MRI FOR PATIENTS WITH TEMPEROMANDIBULAR JOINT DISORDER- A PROSPECTIVE STUDY

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CERTIFICATE

This is to certify that this dissertation titled **"CLINICAL CORRELATION OF ARTICULAR DISC MORPHOLOGY AND POSITION IN MRI FOR PATIENTS WITH TEMPEROMANDIBULAR JOINT DISORDER- A PROSPECTIVE STUDY"** is a bonafide record of work done by **Dr. R. Subha** under my guidance during her postgraduate study period **2010-2013.**

This dissertation is submitted to **THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY,** in partial fulfillment for the degree of **MASTER OF DENTAL SURGERY, BRANCH IX – Oral Medicine & Radiology.**

It has not been submitted (partial or full) for the award of any other degree or diploma.

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LIST OF ABBREVIATIONS

S.NO	ABBREVIATION	EXPANSION
1.	AELT	Articular Eminence In Left TMJ
2.	AERT	Articular Eminence In Right TMJ
3.	DMLT	Disc Morphology In Right TMJ
4.	DMRT	Disc Morphology In Right TMJ
5.	DPCMLT	Disc Position In Close Mouth In Left TMJ
6.	DPCMRT	Disc Position In Close Mouth In Right TMJ
7.	DPOMLT	Disc Position In Open Mouth In Left TMJ
8.	DPOMRT	Disc Position In Open Mouth In Right TMJ
9.	MRI	Magnetic Resonance Imaging
10.	TMD	Temperomandibular Joint Disorder
11.	TMJ	Temperomandibular Joint

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ABSTRACT

Background: Temporomandibular disorders (TMD) are defined as "a collective term embracing a number of clinical problems that involve the masticatory muscles, the temporomandibular joint and associated structures, or both".MRI is an excellent imaging method for evaluating soft tissue abnormalities of the TMJ with a very high predictive value.

Aim: The aim of this study is to correlate the clinical signs and symptoms of temporomandibular joint (TMJ) disorder with articular disc morphology and position in MRI.

Methodology: A Prospective analytical study was conducted among 15 patients with symptomatic temporomandibular joint disorders. Patients were clinically examined and parameters were recorded. MRI images were taken for these patients and interpreted for articular eminence morphology, articular disc morphology and disc position in open and close mouth. Clinical parameters were then correlated with MRI findings. Data was analysed using SPSS software.

Results: Sigmoid was the most prevalent articular eminence morphology on both right (80.0%) and left (60.0%) TMJ. Biconcave was the predominant disc morphology on both TMJ (66.7%). Disc was posteriorly positioned in open mouth in both TMJ (86.7%) and anterosuperiorly positioned in close mouth in both TMJ(53.3%).

Conclusion: Though we have correlated numerous clinical and radiographic features we couldn't conclude any particular clinical feature with radiographic feature which may be due to smaller sample size.

Key words: Temporomandibular joint disorders, MRI, Articular eminencemorphology,Articulardisc morphology, Articular disc position.

The TMJ is a gliding joint, formed by the condyle of the mandible and the squamous portion of the temporal bone. The articular surface of the temporal bone consists of a convex articular eminence anteriorly and a concave articular fossa posteriorly. The articular surface of the mandible consists of the top of the condyle. Articular surfaces of the mandible and temporal bone are separated by an articular disk, which divides the joint cavity into 2 small spaces[1].

The articular disk is a biconcave, fibrocartilaginous structure, which provides the gliding surface for the mandibular condyle, resulting in smooth joint movement. The meniscus has 3 parts-a thick anterior band, a thin intermediate zone, and a thick posterior band. With the mouth closed, the condyle is separated from the articular fossa of the temporal bone by the thick posterior band. When the mouth is open, the condyle is separated from the articular eminence of the temporal bone by the thin intermediate zone[1].

The structure and biochemical composition of contacting surface of TMJ may be altered by articular disk displacements. Disk deformation and/or perforation, atypical cellular architecture, osteophyte formation, subchondral bone resorption, disruption of the physical continuity of the articular surface of the mandibular condyle, and adhesion formation have all been observed in TMJs with articular disk displacement[3].

According to the American Academy of Orofacial Pain (Okeson 1996), temporomandibular disorders (TMD) are defined as “a collective term embracing a number of clinical problems that involve the masticatory muscles, the temporomandibular joint and associated structures, or both”. They are considered to be a subclassification of musculoskeletal disorders, and typically run a recurrent or chronic course, with a substantial fluctuation of TMD signs and symptoms over time. Common signs and symptoms of TMD are clicking noises in the temporomandibular joint (TMJ), limited jaw opening capacity, deviations in the movement patterns of the mandible and masticatory muscle and/or TMJ pain in the face[2].

The basic principles of MRI were applied in diagnostic imaging in late 1970s and early 1980s. There are no significant biologic side effects of MRI except for certain precautions. In TMJ, the areas of concern are disk cartilage signal characteristics, joint effusion and bone marrow signal patterns. They are an excellent means of evaluating soft tissue abnormalities of the TMJ with a very high predictive value[4].

It is recommended that examinations of TMJ be performed in corrected sagittal and coronal projections. The coronal projection is essential for diagnosing lateral and medial disk displacement. The axial projection is of relatively little value and not recommended for diagnosis of disk position and osseous abnormalities of TMJ. A series of images can be obtained at incremental mouth opening and closing which can be replaced as a cine display, illustrating the movement of disk and condyle. These non-invasive examinations make it possible to study joint function and the influence of abnormal joint function on the soft tissue surrounding the joint[4].

Articular disc morphology, position of the disc in relation to condyle and articular eminence morphology can be viewed in MRI.

Retrospective studies support the general idea that TMJ internal derangement is likely to progress to osteoarthritis. Katzberg et al suggested that obstruction by disc displacement without reduction produced compressive forces that impaired contacting structures in the joint[4].

The purpose of the study is to the clinical characteristics of temporomandibular joint (TMJ) disorder patients with articular disc morphology and position in MRI.

AIM OF THE STUDY:

The aim of this study is to correlate the clinical signs and symptoms of temporomandibular joint (TMJ) disorder patients with articular disc morphology and position in MRI.

OBJECTIVES OF THE STUDY:

1. To analyse the configuration and position of articular disc in TMJ disorder patients.
2. To correlate the clinical symptoms of pain/clicking/deviation of symptomatic TMJ disorder patients with articular disc morphology and position in MRI.

Temporomandibular joint disorder (TMD) is a global common disease, which generally includes a number of separate entities and multiple etiologies, whose clinical signs or symptoms are almost always clustered into muscle disorders, intracapsular derangements of the components of the temporomandibular joint (TMJ) and degenerative changes in the bony components of the joint itself. Imaging plays a vital role in the diagnosis of TMDs. This study aims to elucidate the disc morphology and position in MRI of patients with temporomandibular disorders.

Functional Anatomy[5]

The temporomandibular joint or craniomandibular articulation is a ginglymoid-arthrodial joint. Each joint is an articulation between the articular tubercle eminence of the squamous portion of the temporal bone (the mandibular fossa or glenoid fossa) and the mandibular condyle. A fibrous disc, which acts as a third bone, is interposed between the condyle and the fossa formed by the temporal bone. These paired joints and the mandible, a single bone that crosses the skeletal midline, function together since neither joint is capable of independent movement. That is, one temporomandibular joint cannot possibly move without producing movement in the opposite joint.

The human mandible is the first bone of the body to demonstrate an ossification center. At approximately six weeks in utero, developing from the mandibular process of the first branchial arch, the mandible is seen as a thin plate of bone in close association to the lateral side of the anterior region of Meckel's cartilage on both sides of the developing face. Although Meckel's cartilage does not contribute much to mandibular development, it does to the incus, malleus, sphenomandibular and malleo-mandibular ligaments. All major portions of the mandible (the body, ramus, coronoid and condylar processes), develop by intramembranous ossification. Only the articular surface of the condyle and the tip of the coronoid process develop by endochondral ossification. The articular eminence of the temporal bone is composed of compact bone overlying trabecular bone with marrow spaces. Both the articular eminence and the articulating surface of the condyle are covered with fibrocartilage, not hyaline cartilage, as in most other articulations of the body.

The temporomandibular joint is richly innervated by three different branches of the third division of the trigeminal nerve. The auriculotemporal nerve, providing innervation to the posterior, lateral and some medial portions of the joint, contributes approximately 75% of the total sensory supply to the joint. Anterior and medial innervation of the temporomandibular joints is provided by the masseteric nerve, giving about 15% of the total innervation. The posterior deep temporal nerve, supplying about 10% of the this innervation, furnishes sensory innervation to a small area in the anterolateral portion of the joint.

Blood flow to the temporomandibular joints is also abundant and from many sources. The principle blood supply comes from the superficial temporal artery and branches of the maxillary artery, both of which are the terminal branches of the external carotid artery. Venous drainage is provided by companion veins, all of which contribute to the retromandibular vein, and by the facial vein, which contributes to the anterior jugular vein.

TERMINOLOGY

Over the years functional disturbances of the masticatory system have been identified by a variety of terms. In 1934, James Costen described a group of symptoms that centered on the ears and TMJ. Because of his work the term Costen Syndrome developed. Later the term Temporomandibular joint disturbances became popular. In 1959, Shore introduced the term Temporomandibular joint dysfunctional syndrome. Later came the term Functional Temporomandibular joint disturbances coined by Ash and Ramfjord. Some terms described the suggested cause such as, Occlusomandibular disturbances and myoarthropathy of the temporomandibular joint. Others stressed pain such as pain dysfunction syndrome, myofacial pain dysfunction syndrome and temporomandibular pain dysfunction syndrome. Because the symptoms are not always isolated to the TMJ, some authors believe that the foregoing terms are too limited and that a broader, collective term should be used, such as Craniomandibular disorders. Bell suggested the term **Temporomandibular disorders** which has gained popularity. This term does not suggest merely problems that are isolated to the joint, that includes all disturbances associated with the function of the masticatory system.

DEFINITION

According to the American Association of Orofacial Pain (AAOP) definition, a temporomandibular disorder (TMD) is: "a collective term embracing a number of clinical problems that involve the masticatory musculature, the temporomandibular joint and associated structures, or both."

Internal derangement of the temporomandibular joint (TMJ) may be defined as a disruption within the internal aspects of the TMJ in which there is a displacement of the disc from its normal functional relationship with the mandibular condyle and the articular portion of the temporal bone[6].

Disk displacement with reduction: disk is displaced from its position between the condyle and eminence to an anterior and medial or lateral position but is reduced in full opening, usually resulting in a noise[6].

Disk displacement without reduction with limited opening: disk is displaced from normal position between condyle and fossa to an anterior and medial or lateral position, associated with limited opening[6].

Disk displacement without reduction without limited opening: disk is displaced from its position between condyle and eminence to an anterior and medial or lateral position, not associated with limited opening[6].

CLASSIFICATION

The research diagnostic criteria (RDC) developed by Dworkin and LeResche (1992), established a dual diagnosis that recognizes not only the physical conditions (axis I), including muscle disorders, disc displacements and other types of joint conditions that may contribute to the pain disorder, but also the psychosocial issues (axis II) that contribute to the suffering, pain behavior, and disability associated with the patient's pain experience.

TMD's RDC groups: Classification of temporomandibular joint disorders. Axis I. (Dworkin and LeResche, 1992 axis I).[7]

I GROUP I: Muscle disorders:

Ia. Myofascial pain

Ib. Myofascial pain with limited opening

II GROUP II: Disc Displacements (DD):

IIa. DD with reduction

IIb. DD without reduction with limited opening

IIc. DD without reduction without limited opening

III GROUP III: Other common Joint disorders:

IIIa. Arthralgia

IIIb. Osteoarthritis

IIIc. Osteoarthrosis

The subtype classification of temporomandibular joint disorder established by the Japanese Society for the Temporomandibular Joint in 2001[8].

Type I: Masticatory muscle disorder

There is jaw movement pain in the muscle whose region can be identified.

Type II: Capsule-ligament disorder

There is movement pain in the TMJ with palpation tenderness. (This category includes chronic and traumatic diseases of either the retrodiscal tissue, joint capsule or ligament)

Type III: Disc disorder

Type IIIa: Disc displacement with reduction

There is a clicking sound or temporal sticking motion when opening and closing the mouth.

Type IIIb: Disc displacement without reduction

There is trismus and jaw opening pain or clenching pain after the disappearance of clicking. A protrusive slide of the mandibular condyle is usually disturbed on the problem side.

Type IV:Degenerative joint diseases, osteoarthritis, osteoarthrosis

There is at least one of joint pain, a trismus or a joint sound. A picture image reveals marginal proliferation (osteophyte), erosion or a deformity of the mandibular condyle.

Type V: Cases not included type I-IV

CLASSIFICATION OF INTERNAL DERANGEMENT[4]

Early Stage

Clinical: No significant mechanical symptoms other than reciprocal clicking (early in opening movement, late in closing movement, and soft in intensity); no pain or limitation in opening motion

Radiologic: Slight forward displacement; good anatomic contour of disk; normal tomograms

Surgical: Normal anatomic form; slight anterior displacement; passive incoordination (clicking) demonstrable

Early-Intermediate Stage

Clinical: First few episodes of pain; occasional joint tenderness and related temporal headaches; beginning of major mechanical problems; increase in intensity of clicking sounds; joint sounds later in opening movement; and beginning transient subluxations or joint catching and locking.

Radiologic: Slight forward displacement; slight thickening of posterior edge or beginning of anatomic deformity of disk; normal tomograms.

Surgical: Anterior displacement; early anatomic deformity (slight to mild thickening of posterior edge); well-defined central articulating area.

Intermediate Stage

Clinical: Multiple episodes of pain, joint tenderness, temporal headaches, major mechanical symptoms: transient catching, locking, and sustained locking (closed locks); restriction of motion; difficulty (pain) with function.

Radiologic: Anterior displacement with significant anatomic deformity or prolapse of disk (moderate to marked thickening of posterior edge); normal tomograms.

Surgical: Marked anatomic deformity with displacement; variable adhesions (anterior, lateral, and posterior recesses); no hard-tissue changes.

Intermediate-Late Stage

Clinical: Characterized by chronicity with variable and episodic pain, headaches, variable restriction of motion; undulating course.

Radiologic: Increase in severity over intermediate stage; abnormal tomograms; early to moderate degenerative remodeling; hard-tissue changes.

Surgical: Increase in severity over intermediate stage; hard-tissue degenerative remodeling changes of both bearing surfaces; osteophytic projections; multiple adhesions (lateral, anterior, and posterior recesses); no perforation of disk or attachment.

Late Stage

Clinical: Characterized by crepitus on examination; scraping, grating, grinding; variable and episodic pain; chronic restriction of motion; and difficulty with function.

Radiologic: Anterior displacement; perforation with simultaneous filling of upper and lower compartments; filling defects; gross anatomic deformity of disk and hard tissues; abnormal tomograms; essentially degenerative arthritic changes.

Surgical: Gross degenerative changes of disk and hard tissues; perforation of posterior attachments; erosions of bearing surfaces; multiple adhesions equivalent to degenerative arthritis (sclerosis, flattening, and anvil-shaped condyle, osteophytic projections, and subcortical cystic formation).

Clinical Stages[6]

Anatomical, epidemiological and clinical studies have shed some light upon the ultimate fate of the displaced disc. Traditionally, internal derangement of the TMJ has been described as a progressive disorder with a natural history that may be classified into four consecutive clinical stages: stage one has been described as disc displacement with reduction, stage two as disc displacement with reduction and intermittent locking, stage three as disc displacement without reduction (closed lock), and stage four as disc displacement without reduction and with perforation of the disc or posterior attachment tissue (degenerative joint disease).

Stage One

Stage one is characterized clinically by reciprocal clicking as a result of anterior disc displacement with reduction. Although it has been stated that the later the opening click occurs, the more advanced the disc displacement, diagnostic assignment based on joint sounds has recently come under question. The fifth World Congress on Pain determined that “Clinic cases cannot be distinguished from controls on the basis of clinically detectable joint sounds.” This concept is further emphasized by Rohlin and others, who showed in an arthrographic study that anterior displacement with reduction can exist without joint noises (i.e., false negative).

The clinical hallmark of disc displacement with reduction is limited mouth opening, usually accompanied by deviation of the mandible to the involved side, until a pop or click (reduction) occurs. After the pop, the patient is able to open the mouth fully with a midline position of the mandible. Arthrograms show anterior disc displacement in centric occlusion, but the disc is normally located in the open-mouth position.

Stage Two

Stage two features all the aforementioned characteristics, plus additional episodes of limited mouth opening, which can last for various lengths of time. Patients may describe it as “hitting an obstruction” when opening is attempted. The “obstruction” may disappear spontaneously or the patient may be able to manipulate the mandible beyond the interference. Arthrographically, stage two is similar to stage one.

Stage Three

Closed lock (disc displacement without reduction) occurs when clicking noises disappear but limited opening persists. The patient complains of TMJ pain and chronic limited opening, with the opening usually less than 30 mm. Examination will reveal preauricular tenderness and deviation of the mandible to the affected side with mouth opening and protrusive movements. TMJ pain may accompany border movement. Interestingly, arthrocentesis and arthroscopic surgery have documented consistently high success rates in relieving this particular pattern of internal derangement. Arthrographic examination and magnetic resonance imaging show anterior disc displacement in both centric occlusion and maximal mouth open positions. Limited condylar translation may also be evident.

In chronic closed lock episodes, if the condition progresses, the condyle may steadily push the disc forward to achieve almost normal ranges of mouth opening, in spite of the presence of a non-reducing disc.

Stage Four

With continued mandibular function, the stretched posterior attachment slowly loses its elasticity, and the patient begins to regain some of the lost range of motion. As retrodiscal tissue continues to be stretched and loaded, it becomes subject to thinning and perforation. Anatomic studies have shown that this tissue may remodel before it succumbs, ill-adapted to the functional load, and perforates. In addition, arthrograms have shown joint crepitus to be highly suggestive of but clearly not pathognomic of disc perforation.

Although often classified as characteristic of a separate final stage, hard tissue remodelling probably occurs throughout all stages. Clinically, osteoarthrosis may be diagnosed because the remodelling often occurs unilaterally, the symptoms appear to worsen as the day goes on, crepitation as distinct from clicking is often present and radiographic evidence is frequent (e.g., flattening, sclerosis, osteophytes, erosion).

The Progressive Nature of Internal Derangement

Although in many patients internal derangement undergoes the progressive changes just described, it is still not clear whether this progression happens in all cases. In fact, longitudinal epidemiological studies do not seem to support the idea of progression. For 10 years, Magnusson and others studied 293 subjects with clicking. At the five-year follow-up, clicking had not changed to locking in any of the subjects.[9] At the 10-year follow-up, only one of the 293 subjects reported intermittent locking[10].

Additionally, the authors reported that half the patients who exhibited clicking at age 15 no longer did so at age 20, and about half of those who did not exhibit clicking at age 15 went on to develop clicking. Thus, the probability that TMJ clicking would disappear in a symptomatic individual was equal to the probability of it appearing in an asymptomatic individual. This lack of progression of internal derangement from a reducing disc to a non-reducing disc condition was confirmed in studies by Greene and Laskin, Laskin and Lundh and others[11].

Sato and others[12] studied the natural course of anterior disc displacement without reduction in 44 subjects who agreed to observation without treatment. The incidence of successful resolution of the condition was 68% at 18 months. This finding suggests that the signs and symptoms of anterior disc displacement without reduction tend to be alleviated during the natural course of the condition. The authors failed to mention what happened to the anteriorly displaced disc. They noted, however, that the maximal mouth opening increased from 29.7 mm to 38 mm and concluded that it was unlikely that the disc became self-reducing; rather, it was more plausible that there was some stretching and remodelling of the retrodiscal tissues, enabling the disc to be displaced more anteriorly by the translating condyle.

Thus, although clinical evidence does support progressive worsening of the condition in some patients, important clinical questions remain. It is not clear what the progression rate is, nor is it clear which patients have the greatest risk of progressing to more advanced stages. Consequently, clinicians who justify aggressive treatment of asymptomatic TMJ clicking based on their belief in a high progression rate to a non-reducing state should instead exercise patience and clinical vigilance in their management of this condition.

ETIOLOGY

Etiological Concepts

The etiological concepts in its earlier days of inception, were purely mechanistic; attributing the various signs and symptoms to derangement of a particular anatomical region (temporomandibular joint, muscles of mastication or the occlusion). The earlier theories were based on a biomedical model comprising

- The mechanical displacement theory
- The trauma theory
- The biomedical theory
- The osteoarthritic theory
- The muscle theory

The mechanical displacement theory[13] hypothesized that the lack of molar support or functional occlusal prematurities caused a direct eccentric positioning of the condyle in the glenoid fossa, leading to pain, dysfunction and ear symptoms. The faulty condylar position led directly to adverse muscle activity. This theory gained momentum after Costen published his article focusing on occlusion as the most important causative factor for TMD. He proposed that due to the absence of molar support, the powerful elevating muscles of the mandible could press the condyles upward and backward causing damage to nerves and vessels including chorda tympani.

The trauma theory[14] proposed by Zarb and Speck considered micro-/macrotrauma as a principal factor that initiated pathologic processes and dysfunction in different parts of the stomatognathic system thus leading to the symptoms of TMD. According to this theory any trauma which can cause structural alteration to the joint or the muscles is considered Macrotrauma. Microtrauma refers to any small force that is repeatedly applied to the joint structures over a long period of time. Consequently, even though the etiological premise of this theory was related to trauma, it was actually an earlier multidimensional etiological model. However, no critical appraisal for the multitude of factors involved was given in the causation of TMD.

The biomedical theory[15] by Reade also supported the role of trauma in the initiation of the disorder. Once initiated, the condition will either resolve or in presence of certain factors like disrupted occlusion, parafunctional habits (particularly bruxism) and occupational activities, will progress further. Apart from factors causing increase or adverse functional loading, psychological elements were recognized as important maintaining influences. According to Reade (1984) "this theory would explain why similar occlusal interferences do not cause similar symptoms in different individuals and why all individuals with stress do not develop TMD".

The osteoarthritic theory[16] by Stegenga proposed osteoarthrosis as the causative factor for TMD. According to this theory muscular symptoms and internal derangement were secondary to joint pathology pathological changes in the TMJ could be induced by absolute or relative overloading. Absolute overloading of the joint can occur at the time of trauma. Relative overloading could happen if the adaptive capacity of the joint structures is reduced by inflammation and ageing. This theory can explain some subcategories of TMD, but lacks in its ability to explain all the other disorders under the TMD's.

The muscle theory[17] supported by Travell and Rinzler, suggested that the primary etiologic factor was in the masticatory muscles themselves. It suggests that myalgia of masticatory muscles can refer pain to TMJ. The myalgia in the facial region is caused by chronic myospasm which is secondary to parafunctional habits. This theory placed the temporomandibular pain in the context of a wider general muscle disorder and denied any influence of the occlusion.

The neuromuscular theory[18] supported by Ramjford proposed that the occlusal interferences were the causative factor for the disorder. He noted that regional pain associated with bruxism and myalgia was completely eliminated in subjects after occlusal equilibration. This theory proposed that the occlusal interferences caused an altered proprioceptive feedback, leading to incoordination and spasm of some of the masticatory muscles. Slowly the idea of TMD's occurring outside the realm of physical factors started percolating through. Perhaps the very first attempt in this direction was made by Schwartz.

The psychophysiological theory[2] by Schwartz and Laskin, suggested that the psychological factors are more important than the occlusal disturbances in initiating and perpetuating TMD. Spasm of the masticatory muscles, caused by overextension, overcontraction or muscle fatigue due to parafunctions was used by patients as a means to relieve stress. According to this theory it is the interaction between physiological predisposition, and psychological stress which causes TMD. The effect on the individual depended on their ability to cope with stress. Later several theories emerged based on the psychological and psychosocial factors. There is currently considerable evidence that psychological and psychosocial factors are of importance in the understanding of TMD as with other chronic pain disorders.

The psychological theory[19,20] proposed that emotional disturbances initiating centrally, induced muscular hyperactivity which led to Para-functional habits and so indirectly to occlusal abnormalities. It emphasizes emotional factors, particularly stress, whereby tense individuals clench their teeth creating a state of muscle contractility that leads to pain. In TMD patient the behavioural aspect of the patient needs to be studied. Several authors have confirmed the role of psychological factors in TMD.

Various researchers have talked about the influence of personality, mental attitude and behavioral pattern of the patient on TMD [21,22,23].

Despite ample support concerning the relevance of emotional and affective factors in TMD, it is still not clear whether they are the cause or the consequence of pain. Of importance is the recognition of somatization in the assessment and management of TMD, wherein there is a preoccupation with physical symptoms disproportionate to actual physical disturbance. Scientific literature confirms at least the following psychological and psychosocial dimensions as important in the assessment and management of TMD: affective disturbance (depression and/or anxiety), somatization and psychosocial dysfunction. Also poor correspondence between objective signs (peripheral dysfunctional aspects) and subjective symptoms (intrinsic and extrinsic central aspects of pain perception), maladaptive coping resources and excessive use of the health care system are considered important. There is now general agreement that all patients with TMD should be screened for psychological and psychosocial dysfunction.[24]

Gradually, concepts based on a single factor lost their scientific and clinical credibility. As it became more and more apparent that the etiology was multifactorial and that none of these theories in isolation could explain the etiologic mechanisms in TMD patients. The theories advanced from a pure mechanistic view, and expanded to a wider arena inclusive of psychological and behavioral factors. This development also led to the conclusion that temporomandibular disorders were not a single disease but a collection of structural and/ or functional disorders resulting clinically in comparable and analogue complaints. It also became evident that, with respect to the multifactorial etiology, the same factor wielded a different importance in the etiologic process, by playing a role in initiation, precipitation or perpetuation of the symptoms[25].

The Multifactorial Concept[26,27]

The TMJ and the stomatognathic system in general are affected by a large variety of pathological conditions with different prognosis. They often overlap with respect to their signs and symptoms thus making the differential diagnosis in the individual patient difficult resulting in diagnostic errors. It is now generally accepted that the etiology is multifactorial for TMD even though finding the primary etiologic factor can be difficult for the individual patient.

1. Age

The estimated prevalence of TMD in children and adolescents varies from 6-68%, depending on the different diagnostic criteria used and on the differences in clinical examination. In a study published by List et al. in adolescents between 12 and 18 years of age, 7% were diagnosed with temporomandibular pain-dysfunction, the prevalence being significantly higher in females than in males. Clicks were recorded 11% of the study population, with stiffness and mandibular fatigue in 3% and limitations in aperture in 1% [28].

Schmitter et al. reported that geriatric patients experience joint sounds in 38% of the cases and muscle pain in 12%, though without resting pain or joint pain. This contrasts with the group of young patients – with joint sounds in only 7% of cases, but with a much higher incidence of symptoms: facial pain in 7%, joint pain in 16%, and muscle pain in 25%[29].

2. Genetic factors[30]

Michalowicz et al. evaluated the hypothesis that signs and symptoms of TMD may be hereditary. To this effect they collected information by means of a questionnaire administered to a group of 494 monozygous and dizygous twins. The monozygous twins showed no greater similarities than in the case of the dizygous twins, and the homozygous twins that grew up together showed no greater similarities than those that grew up separately. The authors concluded that genetic factors and the family environment exert no relevant effect upon the presence of symptoms and signs of the TMJ.

3. Sex[31]

Epidemiological studies generally document a greater frequency and severity of TMD in females than in males. In effect, TMD is seen to be up to four time more frequent in women, and these tend to seek treatment for their TMJ problems three times more often than males. Attempts have been made to explain these differences in terms of behavioral, psychosocial, hormonal and constitutional differences, though no conclusive results have been drawn to date. It has been suggested that the presence of estrogen receptors in the TMJ of women modulates metabolic functions in relation to laxity of the ligaments, and this could be relevant in TMD. Estrogens would act by increasing vigilance in relation to pain stimuli, modulating the activity of the limbic system neurons. Although not all authors coincide, studies in humans have shown that the appearance of pain in the context of TMD increases approximately 30% in patients receiving hormone replacement therapy (HRT) in postmenopause (estrogens), and approximately 20% among women who use oral contraceptives.

4. Occlusion[32,33,34,35]

Alterations in occlusion such as Angle malocclusions, crossbite, open bite, occlusal interferences, prominent overjet and overbite, crowding, midline discrepancies and missing teeth have been identified in different studies as predisposing, triggering or perpetuating factors. However, on one hand a relatively weak association is observed between occlusal factors and TMD, and on the other hand most studies published in the literature are of a cross-sectional design; as a result, few firm conclusions can be drawn regarding a possible causal relationship.

Donald Selligman and Andrew Pullinger, of the University of California, are probably the authors who have shown the greatest rigor in studying the relationship between occlusion and TMD. In their study published in the year 2000 comparisons were made of a group of women with internal TMJ derangement versus asymptomatic control women. The patients with disc displacement were mainly characterized by unilateral posterior crossbite and long displacement of centric relation to the position of maximum intercuspidation. The patients with osteoarthrosis in turn associated an increased distance between centric relation and maximum intercuspidation, greater overjet and a reduction in overbite. The authors concluded that occlusal alterations may act as cofactors in the identification of patients with TMD, and that some occlusal variables may be a consequence rather than a cause of TMD. The results of this study are partially refuted by Hirsch et al., who after studying 3033 subjects concluded that greater or lesser overjet or overbite – even at extreme values – does not constitute a risk factor for the appearance of joint sounds (reciprocal clicks and crepitation).

In the work published by Magnusson et al., involving the follow-up of 402 patients during 20 years, it was concluded that occlusal factors are weakly associated to TMD, though forced laterality between centric relation and maximum intercuspidation, and unilateral crossbite deserve consideration as possible local risk factors in the appearance of TMD. In view of the information provided by the literature, the precise role of occlusion in TMJ pathology does not seem to be clearly defined. In contrast, and as has been pointed out by Koh et al. in an analysis of the published randomized and quasi-randomized trials on the subject, there appears to be no evidence that occlusal fit treats or prevents TMD, and that it therefore cannot be recommended for the management or prevention of such disorders.

5. Hyperlaxity[36]

Kavuncu et al. evaluated the risk of TMD in patients with systemic and TMJ hypermobility. Local hypermobility was diagnosed in the presence of condylar subluxation, while systemic hypermobility was assessed by means of the Beighton test. The authors found that both local and general hypermobility are more frequently detected in patients with TMD than in the controls, and that the risk of TMJ dysfunction is greater if the patient presents both alterations simultaneously. The investigators concluded that both situations may play a role in the etiology of TMD.

6. Antecedents of acute trauma[36,37]

The possibility that acute trauma may induce histological alterations of the TMJ has been evidenced by studies in rats in which joint synovitis was generated by forcing condylar mobility. Improvement in synovitis or its total disappearance 20 weeks later was also observed.

There are no conclusive results regarding whether acute trauma (whiplash in traffic accidents being the most extensively studied example) acts as a triggering factor of chronic TMD.

Klobas et al. found that patients with antecedents of whiplash showed significant differences versus patients without such antecedents, with more frequent severe TMJ symptoms (89% versus 18%) and also more clinical signs. Likewise, maximum oral aperture was smaller (54 mm versus 48 mm). Pain in response to the palpation of muscles and joints was more common, as was pain in response to mobilization. The authors concluded that the prevalence of TMD is greater among individuals with chronic whiplash injury than in the controls, and that neck injuries can affect TMJ function.

Different results have been published by Probert et al. in a etrospective study in Australia, involving 20,673 traffic accident victims. They documented

28 patients with TMD, and only one of the 237 patients that suffered mandibular fracture required posterior treatment for TMD. They concluded that the incidence of TMD after whiplash is very small, and that this mechanism of trauma alone is unable to account for TMD. Ferrari et al. postulated that a series of cultural and psychosocial factors could in fact be more relevant than whiplash in explaining why some patients in certain societies refer chronic symptoms.

The study by de Coster et al.[38] likewise supports the hypothesis that hyperlaxity could cause TMD, since in a series of 31 subjects with Ehrler-Danlos disease, all presented symptoms of temporomandibular dysfunction and suffered recurrent temporomandibular dislocations. These results are in contrast to those previously reported by Conti et al.,[39] who compared a group of 60 patients with mandibular sounds, pain or block versus a group of 60 asymptomatic patients. No association was found between the intraarticular disorders and systemic hyperlaxity, or between TMJ mobility and systemic hypermobility.

7. Parafunctional habits

Dorland’s Medical dictionary defines parafunction as disorderly or perverted function. Although the relationship between parafunction and muscle pain is biologically plausible, and there is some evidence to suggest a chronological relationship between the two, the fact is that controversy exists regarding this purported causal relationship. Chewing gum has been used in a number of studies to evaluate the appearance of muscle pain with over function.

Karibell et al[40] after inducing the chewing of gum for 6 minutes, found pain to increase in both males and females in the patient group, though unexpectedly it also increased among the women in the control group – thus supporting the hypothesis of increased female susceptibility.

Miyake et al.[41] in a group of 3557 university students, found that chewing gum on one side of the mouth only, and tooth clenching, increased the risk of TMD – though the corresponding odds ratio (OR) only reached 2 for limitation in oral aperture among the subjects that chewed gum on one side only.

In a study published by Winocur et al.[42] in Tel Aviv (Israel) among 323 females aged 15-16, it was seen that those individuals with an intense habit of chewing gum (more than 4 hours a day) associated pain in the ear region at rest and during movement, as well as a greater prevalence of joint sounds. What the authors referred to as “jaw play” (the habit of forced mandibular lateralization or protrusion movements without occlusal contact) appeared less often.

a. Bruxism[43]

The prevalence of bruxism in the adult population is around 20%, and is similar to that recorded in children. In a recent study conducted in Boston by Cheifetz et al., parent interviewing revealed that 38% of the children (in a group of 854 with a mean age of 8.1 years) presented bruxism. However, only 5% of the parents reported subjective symptoms of TMD in their offspring. The greatest incidence of bruxism is between 20 and 50 years of age, after which the habit progressively decreases. Regarding the etiology of bruxism, the intervention of occlusal interferences was initially postulated, though at present emotional stress is considered to be the principal triggering factor. Other factors that have been related to the origin of bruxism are certain drugs, central nervous system disorders, and a certain genetic and/or familial predisposition. Magnusson et al.[44] in a longitudinal study of 420 individuals followed-up on for 20 years, reported a significant correlation between bruxism and TMD. Dental crowding at the start of the study was seen to be a predictor of TMD.

Huang et al.[45] in a study of 274 patients diagnosed with myofascial pain (n=97), arthralgia (n=20), and myofascial pain plus arthralgia (n=157), found the diagnosis of myofascial pain to be significantly associated to tooth clenching (OR=4.8). In the group of patients with myofascial pain plus arthralgia, the odds ratio was 3.3 versus the control group.

8. Stress, anxiety and other psychological factors[46]

In 1955, **Laszlo Schwartz et al.** reported that a group of patients within the population classified as presenting "TMJ syndrome" could be characterized by painful limitation of mandibular movement caused by masticatory muscle spasm, and that this syndrome (known as mandibular pain dysfunction) was probably of myofascial origin. Emphasis was placed on psychological stress rather than on occlusal disharmony, as primary cause of the problem.

In 1969, **Daniel Laskin** proposed the psychophysiological theory of myofascial pain, where stress is defined as a major causal factor. According to this theory, stress induces muscle hyperactivity. Fatigue resulting from such hyperactivity in turn would cause muscle spasms, with the following consequences: contracture, occlusal disharmony, internal derangement and degenerative arthritis. These factors would be able to alter the occlusion pattern during mastication, and this alteration therefore would be the effect rather than the cause of the pain-dysfunction syndrome.

Different studies have confirmed that patients with myofascial pain and with myofascial pain associated to arthralgia, arthritis or arthrosis suffer increased levels of depression and somatization than those diagnosed only with disc displacement.

9. Orthodontic treatment

The possibility that orthodontic treatment could cause TMJ pathology has been extensively dealt with in the scientific literature. Despite the diverse methodological approaches involved, the great majority of studies conclude that orthodontic treatment neither improves nor worsens TMD.

Kim[47] reviewed 31 publications on orthodontics and TMD. He drew attention to the heterogeneity of the methodologies involved in these studies, and pointed out that only one of the reviewed articles found tooth extraction during orthodontic treatment to change the prevalence of TMD. The author concluded that orthodontic treatment does not increase the prevalence of TMD. Mohlin et al[48] are of the same opinion. In a study conducted in Gothenburg (Sweden) involving 337 patients followed-up on between 11 and 30 years of age, they found that orthodontic treatment neither prevents nor improves dysfunction of the TMJ.

EPIDEMIOLOGY

In the National Oral Health Survey conducted in Spain in 1994, in accordance with the criteria for epidemiological studies on oral health auspiced by the World Health Organization (WHO), it was seen that at 12 years of age 6.3% of the population presented clicks – a figure that increased to 9.4% in those aged 15 years, 14.70% in the 35-44 years age range, and 23% in the 65-74 years age group. Limitation of oral aperture was seen to affect

2.2% at 12 years of age, 4.5% in the 35-44 years interval, and 3.5% in the 65-74 years age group. Pain in turn affected 0.2% of the population aged 15 years, 3.4% of those in the 35-44 years age group, and 1.3% of the subjects aged 65-74 years[49].

In the following survey carried out at national level in the year 2000, it was seen that 17.6% of the population aged 35-44 years presented clicks, while 1.8% suffered pain in response to palpation, and 1.8% had limited mobility. Symptoms were detected in 10.8% of the population. In the 65-74 years group, clicks were present in 15.5% of subjects, pain in response to palpation in 2.5%, and reduced mobility in 2.9%. Symptoms were present in 11.2% of the population.[50].

In the studies of prevalence of the disease, the variability is extreme – ranging from 6% to 93% when based on patient-contributed information, and from 0% to 93% when based on clinical evaluation[51].

The epidemiological studies of TMJ alterations based on imaging analyses likewise have been unable to define a standardized pattern in the distribution of the disease. Radiographic changes corresponding to osteoarthrosis appear in 14-44% of the individuals – a figure far from the 1-24% of patients who showcrepitants in response to palpation or to auscultation of the TMJ (crepitation being considered a clinical sign of osteoarthrosis). In contrast to what might be expected, there is a poor correlation between the magnetic resonance imaging (MRI) findings in relation to the alterations of the intra articular meniscus and the corresponding clinical findings.

A total of 240 subjects (103 males, 127 females, mean age 35.7 ± 12.5 years) participated. The prevalence of individuals with at least one TMD symptom was 37%, and no gender differences were found. However, significant differences were found between the levels of psychological factors among females and males who did not suffer from chronic pain[52].

Leonardo R Bonjardim et al conducted a study comprising 196 subjects, aged 18-25 years. According to their results, 50% of the subjects had TMD, but it was of moderate or severe degree in only 9.18% of them. No statistically significant association could be found between TMD and gender or occlusion. TMD was found to have statistically significant association with HADSa but not with HADSd[53].

TMD SYMPTOMS [5]

1. The most common symptoms of a temporomandibular disorder are:

- Ear symptoms.
- Headache.
- Neck and upper shoulder muscle pain.
- Jaw pain.

- Temporomandibular joint noise (clicking, grating) with mandibular movement. (This is only a symptom if it is painful or associated with dysfunction)
- Limited mouth opening and/or disturbances in capacity for mandibular movement.
- Dizziness.
- Pain and paresthesia in the upper extremities.
- Difficulty in swallowing.

TMD Examination[5]

The six parts of the TMD examination include:

1. Case history.
2. Range of motion.
3. Mandibular tracking.
4. Palpation.
5. Auscultation.
6. Joint/muscle challenges (provocations).

IMAGING STUDIES[1]

- Conventional radiography is the most utilized imaging study. It is simple, evaluates bony structures, and in most cases is sufficient.

- Dynamic high-resolution ultrasonography allows for visualization of the morphological elements and the functions of the TMJ, articular disk, mandibular condyle, and lateral pterygoid muscle. It is useful in the evaluation of internal derangements of the TMJ.

- CT scans can explore both bony structures and muscular soft tissues. Of interest, there is utility with cone beam computed tomography (CBCT). The patient is scanned with the mouth open and closed. Specifically, CBCT can aid in the diagnosis of osteoarthritis, rheumatoid arthritis, synovial chondromatosis, and neoplastic disorders

- MRI should be used as the study of choice if an articular or meniscal pathology is suspected and an endoscopic or surgical procedure is contemplated, or in the case of traumatic TMD.

MANAGEMENT[1]

- Most temporomandibular disorders (TMDs) are self-limiting and do not get worse. Simple treatment, involving self-care practices, rehabilitation aimed at eliminating muscle spasms, and restoring correct coordination, is all that is required. Nonsteroidal antiinflammatory analgesics (NSAIDs) should be used on a short-term, regular basis and not on an as needed basis.

- On the other hand, treatment of chronic TMD can be difficult and the condition is best managed by a team approach; the team consists of a primary care physician, a dentist, a physiotherapist, a psychologist, a pharmacologist, and in small number of cases, a surgeon. The different modalities include patient education and self-care practices, medication, physical therapy, splints, psychological counseling, relaxation techniques, biofeedback, hypnotherapy, acupuncture and arthrocentesis.

MRI

MRI is a non-invasive method of mapping the internal structure and certain aspects of function within the body. It uses non-ionizing electromagnetic radiation and appears to be without exposure-related hazard. It employs radio frequency (RF) radiation in the presence of carefully controlled magnetic fields in order to produce high quality cross-sectional images of the body in any plane. The MR Image is constructed by placing the patient inside a large magnet, which induces a relatively strong External magnetic field. This causes the nuclei of many atoms in the body, including Hydrogen, to align them with the magnetic field and later application of RF signal, Energy is released from the body, detected and used to construct the MR image by Computer[54].

History of MRI [55]

The first successful nuclear magnetic resonance (NMR) experiment was made in 1946 independently by two scientists in the United States.

Felix Bloch, working at Stanford University, and **Edward Purcell**, from Harvard University, found that when certain nuclei were placed in a magnetic field they absorbed energy in the radiofrequency range of the electromagnetic spectrum, and re-emitted this energy when the nuclei transferred to their original state.

The strength of the magnetic field and the radiofrequency matched each other as earlier demonstrated by **Sir Joseph Larmor** (Irish physicist 1857-1942) and is known as the **Larmor relationship** (i.e., the angular frequency of precession of the nuclear spins being proportional to the strength of the magnetic field). This phenomenon was termed **NMR** as follows: "**Nuclear**" as only the nuclei of certain atoms reacted in that way; **"Magnetic**" as a magnetic field was required; "**Resonance**" because of the direct frequency dependence of the magnetic and radiofrequency fields. With this discovery NMR spectroscopy was born and soon became an important analytical method in the study of the composition of chemical compounds. For this discovery **Bloch and Purcell** were awarded the **Nobel Prize for Physics in 1952**.

Dr Isidor Rabi, an American physicist who was awarded the Nobel Prize for Physics in 1944 for his invention of the atomic and molecular beam magnetic resonance method of observing atomic spectra, came across the NMR experiment in the late 1930's but considered it to be an artefact of his apparatus and disregarded its importance.

During the 50's and 60's NMR spectroscopy became a widely used technique for the non-destructive analysis of small samples. Many of its applications were at the microscopic level using small (a few centimetres) bore high field magnets.

In the late 60's and early 70's **Raymond Damadian**, an American medical doctor at the State University of New York in Brooklyn, demonstrated that a NMR tissue parameter (termed T1 relaxation time) of tumour samples, measured in vitro, was significantly higher than normal tissue.

Although not confirmed by other workers, Damadian intended to use this and other NMR tissue parameters not for imaging but for tissue characterisation (i.e., separating benign from malignant tissue). This has remained the Holy Grail of NMR yet to be achieved due mainly to the heterogeneity of tissue.

On the 16th March 1973 a short paper was published in Nature entitled "Image formation by induced local interaction; examples employing magnetic resonance". The author was **Paul Lauterbur**, a Professor of Chemistry at the State University of New York at Stony Brook. In this seminal paper Lauterbur described a new imaging technique which he termed zeugmatography (from the Greek zeugmo meaning yoke or a joining together). This referred to the joining together of a weak gradient magnetic field with the stronger main magnetic field allowing the spatial localisation of two test tubes of water. He used a back projection method to produce an image of the two test tubes. This imaging experiment moved from the single dimension of NMR spectroscopy to the second dimension of spatial orientation being the foundation of MRI.

In the late 70's and early 80's a number of groups, including manufacturers, in the US and UK showed promising results of MRI in vivo. This was, and still is, a technological challenge to produce wide bore magnets of sufficient uniformity to image the human body. In the UK these included the group from the Hammersmith (Professor R Steiner & Dr (now Professor) G Bydder) collaborating with Picker Ltd. (a subsidiary of GEC) at Wembley (Dr Ian Young), two independent groups in Nottingham (**Professor P Mansfield and Dr W Moore**), and in Aberdeen (**Professor J Mallard & Dr J Hutchinson**). The first commercial MR scanner in Europe (from Picker Ltd.) was installed in 1983 the Department of Diagnostic Radiology at the University of Manchester Medical School (Professor I Isherwood & Professor B Pullen).

Basic MR Physics [56]

Atomic Structure: The nucleus of an atom consists of two particles;

1. Protons : The protons have a positive charge and

2. Neutrons: The neutrons have a neutral charge.

3. Electrons: Orbiting the nucleus are the electrons, which carry a negative charge.

The two properties commonly used to categorize elements are:

1. The atomic number which represents the number of protons in the nucleus and is the primary index used to differentiate atoms.

2. The atomic mass number which is the total number of protons and neutrons.

Atoms with the same atomic number but different atomic weight are called isotopes. A third property of atomic nuclei is called nuclear spin. All of these particles are in motion. Both the neutrons and protons spin about their axis[56].

Spin: Spin is a fundamental property of nature like electrical charge or mass. Spin comes in multiples of 1/2 and can be + or - Protons, electrons, and neutrons possess spin. Individual unpaired electrons, protons, and neutrons each possess a spin of 1/2.

Properties of Spin: When placed in a magnetic field of strength B, a particle with a net spin can absorb a photon, of frequency. The frequency depends on the gyromagnetic ratio, of the particle.

$$\nu = \gamma B$$

For hydrogen, γ= 42.58 MHz / T.

Nuclei suitable for MRI are those which have an unpaired proton or neutron which possess net spinning charge or have angular momentum. This is because, as spin is associated with an electrical charge, a magnetic field is generated in nuclei with impaired nucleons, causing these nuclei to act as magnets with North and South poles (magnetic dipoles)[57].

Importance of hydrogen nucleons in MRI

It is the major species that is MR sensitive and most abundant atom in the body in the form of water (H2O). For the hydrogen nucleons which consist of a solitary, unpaired proton acts as a magnetic dipole. These magnetic dipoles, in the absence of external influence, are randomly oriented and as such have zero net Magnetization. When an external magnetic field is applied to this sample, all the hydrogen nuclear axes true up in the direction of the magnetic field, producing a quantity of net magnetization, and this can result in of 2 ways either in the direction of the filed i.e., which parallel the external magnetic field – spin up, or align anti-parallel (opposite) with the magnetic field, spin down. These orientations correspond to lower energy state and highly energy states of the dipole respectively. Nuclei can be made to undergo transition from one energy state to another by absorbing or releasing certain quantity of energy. This energy can be supplied or recovered in the form of electromagnetic energy in RF portion of the electromagnetic spectrum and this transition from one energy level to another is called resonance.

When an external magnetic field is applied, their N and S poles do not align exactly with the direction of the magnetic field. The axes of spinning protons oscillate or wobble with a slight tilt from a position which was parallel with the flux of external magnet. This tilting or wobbling is called precession. The rate or frequency of precession is called the Resonant or Larmor frequency, which is proportional to the strength of the applied magnetic field. The Larmor frequency of hydrogen is 42.58 MHZ in a magnetic field of 1 Tesla, where one Tesla is 10,000 times the earth's magnetic field. The magnetic field strengths used for MR imaging range from 0.1 to 4.0T.

Larmor equation is expressed as $F = r B$ Where F is the resonant frequency, r is the gyro magnetic ratio and B is the applied filed.

In summary, when nuclei are subjected to the flux of an external magnetic field, two energy states result. Spin-up: which is in the direction of the field and spin-down: This is in the opposite direction of the field. The combined effect of these two energy states is a weak net magnetic moment, or magnetization vector (MV) Parallel with the applied magnetic field. When energy in the form of all electromagnetic wave from a RF antenna coil is directed tissue with protons (hydrogen nuclei) that are aligned in the Z axis by an external static magnetic field (by the imaging magnet), the protons in the tissue that have a Larmor frequency matching that of electromagnetic wave absorb energy and shift or rotate away from the direction induced by the imaging magnet[58].

If longer the RF pulse is applied, the greater the angle of rotation. If pulse is of sufficient intensity (duration), it will rotate the net tissue magnetization vector into a transverse plane (XY plane), which is perpendicular to longitudinal alignment (Z-Axis) and cause all the protons to process in phase, this is referred to as a 900 RF pulse or a flip angle of 900. At this precise moment, a maximal RF signal is induced in a receiver coil. This signal depends on the presence or absence of hydrogen and also all the degree to which hydrogen is bound within a molecule. Eg: Bone – due to presence of tightly bound hydrogen atoms, they do not align themselves with external magnetic field and do not produce a usable signal.

In soft tissues and liquids – due to presence of loosely bound or mobile hydrogen atoms, tilt and align to produce detectable signal. The measure of the concentration of loosely bound hydrogen nuclei available to create the signal is referred to as proton density or spin density of the tissue in question[58].

When the radio waves (RF pulse) are turned off, 2 events occur simultaneously.

- The radiation of energy and the return of nuclei to their original spin state at a lower energy. This process is called relaxation and the energy loss is detected as a signal, which is called free induction decay (FID).

- First, the nuclei in transverse alignment begin to realign themselves with the main magnetic field and net magnetization regions to the original longitudinal orientation. This relation is accomplished by a transfer of energy from individual hydrogen nuclei (spin) to the surrounding molecules (Lattice).

- The time constant that describes the rate at which the net magnetization returns to equilibrium by this transfer of energy is called the T1 relaxation time or spin lattice relaxation time. (T1–Short – 500msec–short repetition twice between parallel 20 msec – signal recovery). T2 – 2000msec R and 80msec 0 long TE.

A T1 weighted image is produced by a short repetition time between RF pulses and a short signal recovery time. Because T1 is all exponential growth time constant, a tissue with short T1 produces all intense MR signal and is displayed as bright white in a T1 weighted image. A tissue with long T1 produces a – low intensity signal and appears dark in MR image. Second, the magnetic moments of adjacent hydrogen nuclei begin to interfere with one another; this causes the nuclei to diphase, with a resultant loss of transverse magnetization. The time constant that describes the rate of loss of transverse magnetization is called T2 relaxation time / transverse (Spin) relaxation time. The transverse magnetization rapidly decays (exponentially) to zero, as do the amplitude and duration of the detected radio signal. A T2-weighted image is acquired using a long repetition tine between RF pulses and a long signal recovery time. A tissue with a long T2 produces a high-intensity signal and is bright in the image. One with short T2 produces a low-intensity signal and is dark in the image[58].

Image contrast among the various tissues in the body is manipulated in MRI by varying the rate at which the RF pulse is transmitted A short repetition tine (TR) of 500msec between pulses and a short echo of signal recovery tine (TE) of 20msec produces T1 weighted image. A long TR (2000msec) and a long TE (80msec) produces T2 weighted images for every diagnostic task, the operator must decide which imaging sequence will being out optimal image contrast. T1 weighted images are called fat images because the fat has the shortest T1 relaxation tine and the lightest signal relative to other tissues and thus appear bright in the image. High anatomic detail is possible in this type of image because of good image contrast. T1 weighted images are thus useful or depicting small anatomic regions (eg: TMJ) where high spatial resolution is required.

T2 Weighted images are called water images because water has the longest T2 relaxation tine and thus appear bright in the image. In general, the T2 time of abnormal tissues is longer than that of normal tissues. Images with

T2 weighting are most commonly used when the practitioner is looking for inflammatory changes and tumors[59].

T1 Weighted images are more commonly used to demonstrate anatomy. In practice, images often must be acquired with both T1 and T2 weighting to separate the several tissues by contrast resolution. Localization of MRI to specific part of the body (selecting a slice) and the ability to create a 3 dimensional image depends on the fact that the larmor frequency of a nucleus is governed in part by the strength of the external magnetic field.

The magnetic gradient is produced by three electromagnetic coils within the bore of imaging magnet. The coils surround the patient and produce magnetic field that oppose and redirect the magnetic flux in 3 orthogonal or right angle directions to delineate individual volumes of tissues (vowels), which are subjected to magnetic fields of unique strength.Partitioning the local magnetic fields lines all the hydrogen protons, in particular voxel to the same resonant frequency. This is called selective excitation, when a RF pulse with a range of frequencies is applied, a voxel of tissue tuned to one of the frequencies is excited, when the RF radiation is terminated, the excited voxel radiates that distinctive frequency, identifying and localizing it. The band width or spectrum of frequencies of the RF pulse and the magnitude of slice selecting gradient determine the slice thickness. Slice thickness can be reduced by increasing the gradient strength or decreasing the RF band width (frequency range). After the MRI scanning is completed, the computer generates visual images of the area of the body that was scanned and these images are transferred to film (hard copy), this film is interpreted by the radiologist.

Signal localization: techniques for building images: encoding process, two concepts need to be separated. The physical relationship that makes building up an image possible is the proportional relationship of the resonant frequency to the strength of the magnetic field (Larmor equation).

Advantages of MRI[57]

1. No Ionizing Radiation: RF pulses used in MRI do not cause ionization and have no harmful effects of ionizing radiation. Hence can be used in child bearing ladies and children.

2. Non-invasive: MRI is non-invasive.

3. Contrast resolution: It is the Principle advantage of MRI, i.e. ability of an image process to distinguish adjacent soft tissue from one another. It can manipulate the contrast between different tissues by altering the pattern of RF pulses.

4. Multiplanar image: With MRI, we can obtain direct, sagittal, coronal and oblique image which is impossible with radiography and CT.

5. It could differentiate between acute and chronic transit and fibrous phases parallel with histopathological changes.

6. Absence of significant artifact associated with dental filling.
7. No adverse effect has yet been demonstrated.
8. Image manipulation can be done.
9. Useful in determining intramedullary spread.

Disadvantages of MRI[57]

1. Claustrophobia i.e. morbid fear of closed places because the patient is within the large magnet up to one hour.
2. MRI equipment is expensive to purchase, maintain, and operate. Hardware and software are still being developed.
3. Because of the strong magnetic field used in patient electrically, magnetically or mechanically activated implants such as cardiac pacemakers, implantable defibrillators and some artificial heart valves may not be able to have MRI safely.
4. The MRI image becomes distorted by metal, so the image is distorted in patients with surgical clips or stents, for instance.
5. Bone does not give MR signal, a signal is obtained only from the bone marrow. Long scanning time and requires patient's co-operation.

6. The very powerful magnets can pose problems with sitting of equipment although shielding is now becoming more sophisticated.

7. MRI scanners are noisy.

8. Patient could develop an allergic reaction to the contrasting agent, or that a skin infection could develop at the site of injection.

9. MRI cannot always distinguish between malignant tumors or benign disease, which could lead to a false positive result.

10. Facilities are not widely available, but with the development of small open systems suitable for district general hospitals.

11. Bone, teeth, air and metallic objects all appear black, making differentiation difficult.

REVIEW OF STUDIES IN MRI

Vijay M. Rao et al in 1989[60] conducted a study in 276 TM joints in 138 symptomatic patients were analyzed in a retrospective study to determine the condylar shape and size and to correlate it with internal derangement in MRI. The regressive condylar changes in TM joints with internal derangement were more common (61%) than proliferative bony changes (39%). On the converse, none of the TM joints with regressive condyles revealed normal disc. The altered bony morphology also correlated with the severity of internal derangement, i.e. bony changes in TM joints with anterior closed lock were noted in 64% compared to 45% with reducible disc

Major P et al in 1999[61] conducted a study in 43 patients with AS and 16 controls to evaluate temporomandibular joint (TMJ) articular disc position and osseous degenerative changes using magnetic resonance imaging (MRI) as well as clinical symptoms of temporomandibular disorders in patients with ankylosing spondylitis. TMJ disorder symptoms of headache duration and frequency, TMJ pain duration and frequency, and painful jaw movement were more frequent in patients with AS ($p < 0.05$). Significant differences were also observed in MRI indices for disc displacement (AS, 0.89; controls, 0.36; $p = 0.005$) and degenerative changes (AS, 0.55; controls, 0.06; $p = 0.01$). A total of 50 (62%) joints in the AS group had disc displacement compared to 11 (34%) joints in the controls. A total of 16 (20%) joints in the AS group had degenerative change compared to 2 (6%) joints in the controls.

V Milan et al in 2000[62] conducted a study in 98 patients to analyse the prevalence of disc displacements and deformations from MRI of symptomatic temporomandibular disorders. Eighty per cent of patients had bilateral displacement, 15% unilateral and 5% a normally positioned disc. Complete anterior displacement was the commonest and sideways the rarest. Reduction was present in 58% of disc displacements, no reduction in 26%, incomplete reduction in 4%, while in the remaining 12%, it could not be determined. Rotational displacement was the most likely to feature reduction and sideways the least. Temporomandibular joints with no reduction were closely correlated with bone lesions. The most frequent deformation was biplanar and the rarest enlargement of the posterior band.

Mehmet DALKIZ et al in 2001[63] conducted a study in 251 patients (502 joints) to evaluate clinical findings and MRI features of temporomandibular joint (TMJ) disorders. A total of 175 of the TMJs were found to be normal according to MRI findings. Fifty-six unilateral, and 210 bilateral anterior disc displacement with reduction were detected, as well as nine unilateral, and 12 bilateral ADDWR, 21 unilateral, and 58 bilateral ADDR+E; 10 unilateral, and 18 bilateral ADDWR+E; 28 unilateral, and 35 bilateral degenerative arthritic changes; 44 unilateral, and 19 bilateral osteophytes were found. The MRI of TMJs were found normal in 17.9% patients (29.2% female, 5.6% male) with clinical variables. Most of the patients (190 female, 56 male) with TMJ disorders were found to have psychological problems.

N Guler et al in 2003[64] conducted a study in 64 patients with bruxing behaviour with clinically diagnosed internal derangements of the temporomandibular joint to correlate MRI findings with clinical symptoms of pain and joint sounds. Sixty joints with internal derangement from 30 patients without bruxing behaviour served as a control group. Of the 102 joints in the study group with disc displacement, 53 (52%) showed disc displacement with reduction and 49 (48%) showed disc displacement without reduction. In the control group, 16 joints were classified as normal. Of the remaining 44 joints, 27 (61%) had disc displacement with reduction and 17 (39%) had unilateral disc displacement without reduction. Condylar bony changes were seen in

55% of the reducing joints in the study group and in 38% of the reducing joints in the control group, compared with 86% of the non-reducing joints in the study group and 24% of the non-reducing joints in the control group. There was a strong correlation between age and degenerative change in the study group. In the reducing joints, there was a significant difference in the prevalence of condylar bony changes between the study and control groups). In non-reducing joints, 30% of painful joints in the study group and 59% of those in the control group showed a strong signal in the joint space on T2 weighted imaging. Statistically significant differences between the study and control groups were also found for disc form and the prevalence of effusion and disc displacement. Joint sounds were important in unilaterally affected joints in the study group. A statistically significant correlation was found between joint sounds and reducing joints.

D. Melchiorre, A. Calderazzi et al in 2003[65] conducted a study in 33 patients (22 with RA and 11 with PsA) to define the diagnostic value of ultrasonographic (US) examination in comparison with magnetic resonance imaging (MRI) for the assessment of temporomandibular joint (TMJ) involvement in rheumatoid arthritis (RA) and psoriatic arthritis (PsA). Pathological changes of the TMJ were observed by MRI in 24 patients and by US in 31 patients. The sensitivity and specificity of US were calculated in comparison with MRI. The sensitivity was 72.2% and the specificity was 60% in the assessment of pathological changes of the TMJ. The sensitivity was

69.6% with specificity of 30.0% in the assessment of alterations of the disc; the sensitivity was 70.6% with specificity of 75.0% in the assessment of joint effusion. Significant concordance was not observed in the assessment of condylar alterations. US imaging appears able to detect different pathological changes of the TMJ and may be considered an important diagnostic tool for clinical evaluation of the TMJ in RA and PsA.

Peterova V et al in 2004[66] conducted a study in 26 patients with TMJ disorders to evaluate findings of MR investigation of the TMJ. MR verified dysfunction was observed in 48 investigated TMJ (92,3 %), hydrops of the joint was observed in 3 joints (5,8 %), arthrosis of the condylar head in 4 patients (7,6%). Only four TMJ had normal MR finding (7,6 %). MR represents the best method for studying clinically affected joints, for the evaluation of the morphological state of TMJ and the analysis of the dynamic process during mouth opening.

Fabio Henrique Hirata et al in 2007[67] conducted a study in 14 patients with bilateral disc displacement without unilateral reduction assess the shape of the temporomandibular joint (TMJ) articular eminence and the articular disc configuration and position in patients with disc displacement in MRI. Regarding articular eminence shape, the sigmoid form presented the greatest incidence, followed by the box form, in the DDWR side, although this was not statistically significant. In the DDWOR side, the flattened shape was the most frequent ($p = 0.041$). As to disc configuration, the biconcave shape was found in 79% of the DDWR cases and the folded type predominated in 43% of the DDWOR cases. As to disc position, in the DDWR side, “b” (anterosuperior position) was the most frequent, whereas in the DDWOR side, “d” (anteroinferior position) was the most often observed. The side of the patient with altered disc configuration and smaller shape of TMJ articular eminence seems to be more likely to develop non-reducing disc displacement as compared to the contralateral side.

D. Goodarzi Pour et al in 2010[68] conducted a study in 62 TM joints with internal derangement to explore the association between magnetic resonance imaging (MRI), temporomandibular joint (TMJ) scanography and clinical manifestations of joint pain and sounds in patients with temporomandibular (TM) disorder. No significant association was observed between clinical and scanographic findings with MRI. The abnormal range of motion had significant relationship with pain and sound. There was a strong association between sound and condylar flattening.

Zeev V. Maizlin et al in 2010[69] conducted a study in One hundred and forty-four TMJs (in 72 patients) to evaluate whether MRI findings of various degrees of disk displacement could be correlated with the presence of clinical signs and symptoms in patients with a clinical disorder of the TMJ. Disk displacement was found in 45 (54%) of the 84 symptomatic joints and 13 (22%) of the 60 asymptomatic joints. Among the 84 symptomatic joints, 31 (37%) had disk displacement with reduction and 14 (17%) had disk displacement without reduction. In the latter group, 11 (79%) of the 14 joints had significant displacement of the posterior band (8 or 9 o'clock) and 21% had mild displacement of the posterior band (10 o'clock). Of the 60 clinically asymptomatic joints, 47 (78%) had no signs of disk displacement on MRI, whereas 13 (22%) had disk displacement with reduction. None of the asymptomatic joints had disk displacement without reduction. The difference in occurrence of disk displacement between symptomatic and asymptomatic joints was statistically significant. However, the difference in occurrence of disk displacement with reduction of the disk on mouth opening was not statistically significant. Disk displacement on MRI correlated well with clinical symptoms in cases of significant disk displacement and in cases of disk displacement without reduction. When disk displacement with reduction was mild, there was no statistically significant difference between symptomatic and asymptomatic joints, which suggests that other causes should be considered.

Hyung-Joo Choi et al in 2011[70] conducted a study in 97 skeletal Class III adult patients seeking orthodontic treatment to investigate the relationship between temporomandibular joint disk displacement (TMJ DD) and facial asymmetry in skeletal Class III patients in MRI. When the TMJ DD was more advanced on one side than on the other, the chin point usually deviated to the advanced side. When the TMJ DD status was equal or bilaterally normal, the amount of mandibular deviation was not significant.

Study Topic: Clinical correlation of articular disc morphology and position in MRI for patients with temperomandibular joint disorder: A Prospective study.

Study Design: The present study is a prospective analytical study.

Study Duration: This study was conducted between March 2012 to July 2012 in the department of Oral Medicine and Radiology of Ragas Dental College and Hospital, Saravana Scans, Chennai.

Study Population:

A total number of 15 patients were involved in the study.

Obtaining approval from the authorities:

Permission from the ethical committee of **Ragas Dental College and Hospital**, Chennai was obtained before starting the study.

Due consent to participate in the study was obtained from the Subjects in letter format both in Tamil and English.

MATERIALS

Examination of the Patient

Instruments used:

1. Dental chair with halogen lamp
2. Disposable latex gloves
3. Mouth mask
4. Plain mouth mirror
5. Dental probe
6. Metallic scale
7. Divider

RADIOGRAPHIC INVESTIGATION

MRI machine model: Siemens- 1.5 Tesla

METHODOLOGY:

Inclusion criteria:

1. Patients with symptomatic TMJ disorder

Exclusion criteria:

1. Patients with TMJ changes due to developmental anamolies, age changes, trauma, infections, systemic diseases and tumours.
2. Patients with history of previous surgery in TMJ region
3. Patients with internal (implanted) defibrillator or pacemaker, cochlear (ear) implant, clips used on brain aneurysms, metal coils placed within blood vessels

The patients included in the study were made to sit in the dental chair. They were interrogated to collect information regarding name, age, sex, address and chief complaint. They were examined clinically under the following headings.

Pain / Tenderness :

- Character :
- Duration :
- Frequency:
- Functional disruption :

Mouth opening :

Deviation :

TMJ sounds :

Palpation :

Auscultation:

The findings were recorded on the proforma made for the study after getting signature from the patient in the letter of consent.

The patients were then subjected to MRI investigation in Saravana scans, Chennai.

Preparation of the patient prior to examination:

The patients were adviced to wear comfortable, loose-fitting clothing with no metal fasteners. Metal objects including jewelry, eyeglasses, dentures, hairpins, pens and body piercings were removed prior to the examination. The patients were then made to lie flat on their back in the moving examination table. Straps and bolsters were used to help maintain the correct position and to hold still during the examination.

Once the examination procedure is done, the images were obtained and evaluated. The images were obtained with 3-mm oblique-sagittal slices with no spacing.

Articular disc morphology

In order to assess disc configuration, the criterion of Murakami *et al*.[67] was applied, and the disc was characterized, according to its shape, as biconcave, biplanar, biconvex, hemiconvex or folded.

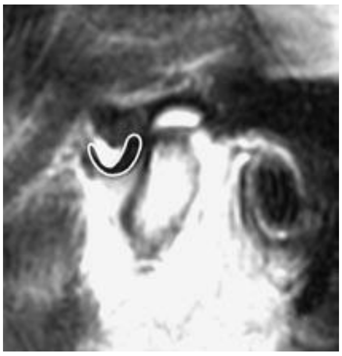
Fig.1: Articular Disc Morphology

A. Biconvex

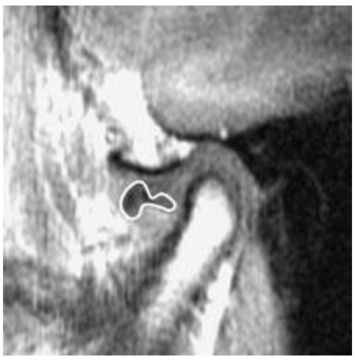
B. Biplanar

C. Biconvex

D. Hemiconvex



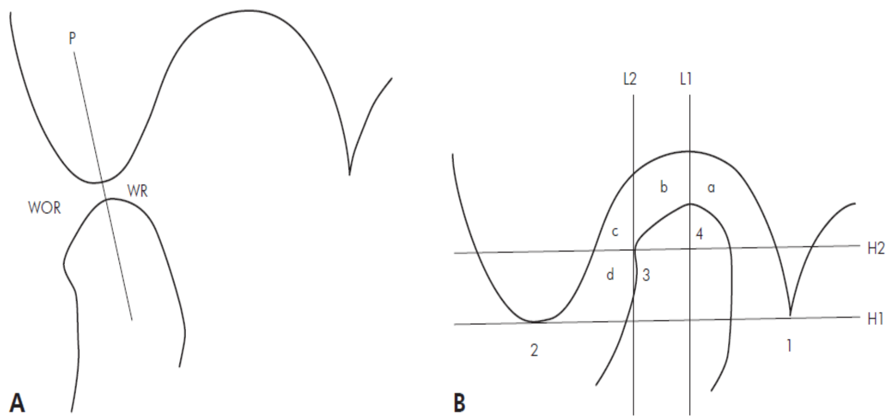
E. Folded



Articular disc position

Disc position was classified following the criterion set by Murakami *et al*.[67] In open mouth position, disc position was classified as anterior position and posterior position. In closed-mouth position, the disc space was divided into four compartments: “a” was the superior position of the disc; “b”, the anterosuperior position;“c”,the anterior position; and “d”, the anteroinferior position.

Fig.2: Articular Disc Position



A: In open-mouth position, the disc space was divided in anterior (WOR - without reduction) and posterior (WR - with reduction) according to P, a line passing through the point at which the condyle is closest to the articular eminence. B: In closed-mouth position, the disc position was classified according to whether the posterior band was in compartment a, b, c or d. H1, tangent from the postglenoid process (1) to articular eminence (2). H2, line parallel to H1 passing through the anterior edge (3) of the functional surface of the condyle. L1, line passing through the posterior edge (4) of the functional surface of the condyle. L2, line parallel to L1 passing through the anterior edge (3) of the condyle surface. Modified from Murakami *et al.*[67]

Articular eminence morphology

Articular eminence morphology was evaluated, according to the criteria set by Kurita *et al*.[67] as box, sigmoid, flattened or deformed and the findings were recorded.

Fig.3: Articular Eminence Morphology

A. Box

B. Sigmoid

C.Flattened

D. Deformed

These findings were then correlated with the clinical characteristics of the patient and subjected to statistical analysis.

STATISTICAL ANALYSIS:

Statistical analysis were done using one- way ANOVA and chi- square tests in SPSS software.

Fig.4: MRI Machine

Fig.5: Patient Positioning

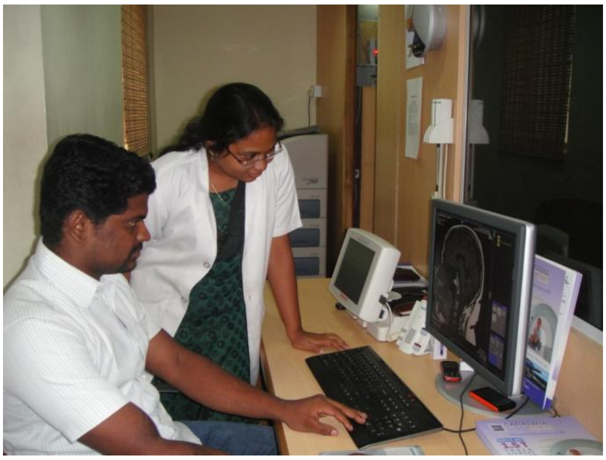


Fig.6: Workstation

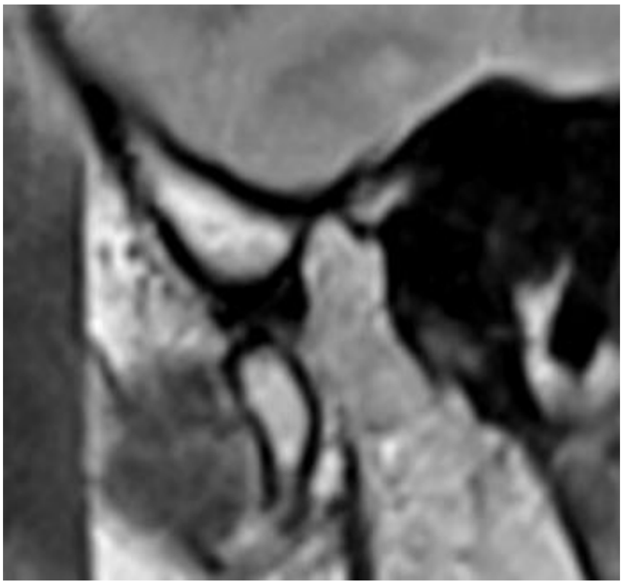


Fig.7a **Fig.7b**

Fig.7a: Showing extraoral picture of the patient and **Fig.7b:** Showing MRI picture depicting biconcave disc

Fig.8a **Fig.8b**

Fig.8a: Showing extraoral picture of the patient and **Fig.8b:** Showing MRI picture depicting biconvex disc


Fig.9a **Fig.9b**

Fig.9a: Showing extraoral picture of the patient and **Fig.9b:** Showing MRI picture depicting folded disc


Fig.10a **Fig.10b**

Fig.10a: Showing extraoral picture of the patient and **Fig.10b:** Showing MRI picture depicting biplanar disc

Table-1 and Graph-1 shows the distribution of subjects according to sex:

A total of 15(100%) subjects were interrogated and examined in this study. Among the 15 subjects, 3(20%) were males and 12(80%) were females.

Table-2 and Graph-2 shows the distribution of subjects according to chief complaint:

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region, 1(6.7%) had pain in the right and left TMJ region, 2(13.3%) had clicking in left TMJ region, 2(13.3%) had clicking in right TMJ region, 1(6.7%) had clicking in both right and left TMJ region, 1(6.7%) had pain and clicking in the right TMJ region, 1(6.7%) had lock jaw.

Table-3 and Graph-3 shows the distribution of subjects according to mouth opening:

In the total of 15(100%) subjects, 7(46.7%) had mouth opening between 30 and 40 mm, 8(53.3%) had mouth opening above 40mm.

Table-4 and Graph-4 shows the distribution of subjects according to deviation:

In the total of 15(100%) subjects, 9(60.0%) did not have deviation, 2(13.3%) had deviation to right, 4(26.7%) had deviation to left.

Table-5 and Graph-5 shows the distribution of subjects according to palpatory findings

In the total of 15(100%) subjects, 2(13.3%) had pain in left TMJ, 1(6.7%) had pain in right TMJ, 1(6.7%) had pain in right and left TMJ, 6(40.0%) had pain and clicking in the left TMJ, 2(13.3%) had pain and clicking in the right TMJ, 1(6.7%) had pain and clicking in the left and right TMJ, 1(6.7%) had pain and crepitus in the left TMJ, 1(6.7%) had pain and crepitus in the right TMJ.

Table-6 and Graph-6 shows the distribution of subjects according to auscultarory findings

In the total of 15(100%) subjects, 4(26.7%) did not have any sounds, 6(40.0%) had clicking in left TMJ, 2(13.3%) had clicking in right TMJ, 1(6.7%) had clicking in left and right TMJ, 1(6.7%) had crepitus in left TMJ, 1(6.7%) had crepitus in right TMJ.

Table-7 and Graph-7 shows the distribution of articular eminence morphology in right TMJ

In the total of 15(100%) MRI images examined for articular eminence morphology, 12(80.0%) were sigmoid, 1(6.7%) was flattened, 1(6.7%) was box and 1(6.7%) was deformed in shape.

Table-8 and Graph-8 shows the distribution of articular eminence morphology in left TMJ

In the total of 15(100%) MRI images examined for articular eminence morphology, 9(60.0%) were sigmoid, 3(20.0%) was flattened, 3(20.0%) was box and none was deformed in shape.

Table-9 and Graph-9 shows the distribution of disc morphology in right TMJ

In the total of 15(100%) MRI images examined for disc morphology in right TMJ, 10(66.7%) were biconcave, 4(26.7%) were biplanar, 1(6.7%) was biconvex in shape.

Table-10 and Graph-10 shows the distribution of disc morphology in left TMJ

In the total of 15(100%) MRI images examined for disc morphology in left TMJ, 10(66.7%) were biconcave, 3(20.0%) were biplanar, 1(6.7%) was biconvex, and 1(6.7%) was folded in shape.

Table-11 and Graph-11 shows the distribution of disc position in open mouth in right TMJ

In the total of 15(100%) MRI images examined for disc position in open mouth in right TMJ, 2(13.3%) were anteriorly positioned and 13(86.7%) were posteriorly positioned.

Table-12 and Graph-12 shows the distribution of disc position in open mouth in left TMJ

In the total of 15(100%) MRI images examined for disc position in open mouth in left TMJ, 2(13.3%) were anteriorly positioned and 13(86.7%) were posteriorly positioned.

Table-13 and Graph-13 shows the distribution of disc position in close mouth in right TMJ

In the total of 15(100%) MRI images examined for disc position in close mouth in right TMJ, 2(13.3%) were anteriorly positioned, 8(53.3%) were anterosuperiorly positioned, 4(26.6%) were superiorly positioned and 1(6.7%) was anteroinferiorly positioned.

Table-14 and Graph-14 shows the distribution of disc position in close mouth in left TMJ

In the total of 15(100%) MRI images examined for disc position in close mouth in left TMJ, 5(33.3%) were anteriorly positioned, 8(53.3%) were anterosuperiorly positioned, 2(13.3%) were superiorly positioned.

Table-15 and Graph-15 shows the Correlation between chief complaint and mouth opening

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region,in which 5(71.4%) had mouth opening between 30 and 40mm, 2(28.6%) had mouth opening above 40mm. 1(6.7%) had pain in the right and left TMJ region, had mouth opening above 40mm(100.0%). 2(13.3%) had clicking in left TMJ region, in which both (100.0%) had mouth opening above 40mm. 2(13.3%) had clicking in right TMJ region, in which both (100.0%) had mouth opening above 40mm. 1(6.7%) had clicking in both right and left TMJ region, had mouth opening between 30 and 40mm, (100.0%). 1(6.7%) had pain and clicking in the right TMJ region, had mouth opening above 40mm(100.0%). 1(6.7%) had lock jaw, had mouth opening between 30 and 40mm(100.0%). The Correlation between chief complaint and amount of mouth opening was insignificant with a P value of 0.15.

Table-16 and Graph-16 shows the Correlation between chief complaint and palpatory findings

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region, in which 2(28.6%) had pain in the left TMJ, 4(57.1%) had pain and clicking in left TMJ, 1(14.3%) had pain and crepitus in left TMJ on palpation. 1(6.7%) had pain in the right and left TMJ region, had pain in the right and left TMJ region on palpation(100.0%). 2(13.3%) had clicking in left TMJ region, in which both(100.0%) had pain and clicking in left TMJ region on palpation. 2(13.3%) had clicking in right TMJ region, both(100.0%) had pain and clicking in right TMJ region on palpation.1(6.7%) had clicking in both right and left TMJ region, who had pain and clicking in both right and left TMJ region on palpation. 1(6.7%) had pain and clicking in the right TMJ region, had pain and crepitus in right TMJ region(100.0%) on palpation. 1(6.7%) had lock jaw, had pain in right TMJ region(100.0%) on palpation. The Correlation between chief complaint and palpatory findings was significant with a P value of 0.001.

Table-17 and Graph-17 shows the Correlation between chief complaint and auscultatory findings

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region, 2(28.6%) did not have any sound, 4(57.1%) had clicking in left, 1(14.3%) had crepitus in left on auscultation. 1(6.7%) had pain in the right and left TMJ region, did not have any sounds in auscultation. 2(13.3%) had clicking in left TMJ region, in which both(100.0%) had clicking in left on auscultation. 2(13.3%) had clicking in right TMJ region, in which both(100.0%) had clicking in right on auscultation. 1(6.7%) had clicking in both right and left TMJ region, had clicking in both right and left TMJ region on auscultation. 1(6.7%) had pain and clicking in the right TMJ region, had crepitus in right TMJ region(100.0%). 1(6.7%) had lock jaw had no sounds(100.0%). The Correlation between chief complaint and auscultatory findings was significant with a P value of 0.007.

Table-18 and Graph-18 shows the Correlation between chief complaint and AERT

In the total of 15(100%) CT images examined for articular eminence morphology, 7(46.7%) had pain in the left TMJ region, in which all 7(100.0%) subjects had sigmoid shape, 1(6.7%) had pain in the right and left TMJ region, who also had sigmoid shape, 2(13.3%) had clicking in left TMJ region, in which 1(50.0%) had sigmoid and 1(50.0%) had box shape, 2(13.3%) had clicking in right TMJ region, in which both had sigmoid shape, 1(6.7%) had clicking in both right and left TMJ region, who also had sigmoid shape 1(6.7%) had pain and clicking in the right TMJ region, who had flattened shape 1(6.7%) had lock jaw had deformed shape. The Correlation between chief complaint and morphology of articular eminence in right TMJ was highly significant with a P value of 0.005.

Table-19 and Graph-19 shows the Correlation between chief complaint and AELT

In the total of 15(100%) CT images examined for articular eminence morphology, 7(46.7%) had pain in the left TMJ region, 3(42.9%) subjects had sigmoid, 3(42.9%) had flattened, 1(14.3%) had box shape, 1(6.7%) had pain in the right and left TMJ region, who had sigmoid shape, 2(13.3%) had clicking in left TMJ region, both (100.0%) had sigmoid shape, 2(13.3%) had clicking in right TMJ region, in which 1(50.0%)had sigmoid shape 1(50.0%)had box shape and 1(6.7%) had clicking in both right and left TMJ region, who had sigmoid shape 1(6.7%) had pain and clicking in the right TMJ region, who also had sigmoid shape 1(6.7%) had lock jaw, had box shape. The Correlation between chief complaint and morphology of articular eminence in left TMJ was insignificant with a P value of 0.53.

Table 20- and Graph-20 shows the Correlation between chief complaint and DMRT

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region, in which 5(71.4%) had biconcave shape, 2(28.6%) had biplanar, 1(6.7%) had pain in the right and left TMJ region, who had biconcave(100.0%). 2(13.3%) had clicking in left TMJ region, in which 1(50.0%) had biconcave, 1(50.0%) had biconvex. 2(13.3%) had clicking in right TMJ region, in which 1(50.0%) had biconcave, 1(50.0%) had biplanar. 1(6.7%) had clicking in both right and left TMJ region, who had biconcave(100.0%). 1(6.7%) had pain and clicking in the right TMJ region, who had biplanar (100.0%).1(6.7%) had lock jaw who had biconcave(100.0%).The Correlation between chief complaint and morphology of disc morphology in right TMJ was insignificant with a P value of 0.47.

Table-21 and Graph-21 shows the Correlation between chief complaint and DMLT

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region, in which 5(71.4%) had biconcave shape, 2(28.6%) had biplanar.

1(6.7%) had pain in the right and left TMJ region, who had biconcave(100.0%). 2(13.3%) had clicking in left TMJ region, in which 1(50.0%) had biplanar, 1(50.0%) had folded. 2(13.3%) had clicking in right TMJ region, in which both (100.0%) were biconcave. 1(6.7%) had clicking in both right and left TMJ region, who had biconcave(100.0%). 1(6.7%) had pain and clicking in the right TMJ region, who had biconcave(100.0%). 1(6.7%) had lock jaw who had biconcex(100.0%). The Correlation between chief complaint and morphology of disc morphology in right TMJ was insignificant with a P value of 0.106.

Table-22 and Graph-22 shows the Correlation between chief complaint and DPOMRT

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region, 1(14.3%) was anteriorly positioned and 6(85.7%) were posteriorly positioned. 1(6.7%) had pain in the right and left TMJ region, which was posteriorly positioned (100.0%). 2(13.3%) had clicking in left TMJ region, both posteriorly positioned(100.0%). 2(13.3%) had clicking in right TMJ region, both posteriorly positioned (100.0%). 1(6.7%) had clicking in both right and left TMJ region, 1(6.7%) had pain and clicking in the right TMJ region, which was posteriorly positioned (100.0%). 1(6.7%) had lock jaw, which was anteriorly positioned (100.0%). The Correlation between chief complaint and disc position in open mouth in right TMJ was insignificant with a P value of 0.27.

Table-23 and Graph-23 shows the Correlation between chief complaint and DPOMLT

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region, in which all were posteriorly positioned(100.0%). 1(6.7%) had pain in the right and left TMJ region, which was posteriorly positioned(100.0%). 2(13.3%) had clicking in left TMJ region, 1(50.0%) was anteriorly positioned and 1(50.0%) was posteriorly positioned. 2(13.3%) had clicking in right TMJ region, in which both were posteriorly positioned(100.0%). 1(6.7%) had clicking in both right and left TMJ region, which was posteriorly positioned(100.0%). 1(6.7%) had pain and clicking in the right TMJ region, which was posteriorly positioned(100.0%). 1(6.7%) had lock jaw, which was anteriorly positioned(100.0%). The Correlation between chief complaint and disc position in open mouth in left TMJ was insignificant with a P value of 0.09.

Table-24 and Graph-24 shows the Correlation between chief complaint and DPCMRT

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region, 4 (57.1%) were superiorly positioned and 3(42.9%) were anterosuperiorly positioned. 1(6.7%) had pain in the right and left TMJ region, which was anterosuperiorly positioned (100.0%). 2(13.3%) had clicking in left TMJ region, 1(50.0%) was anterosuperiorly positioned and 1(50.0%) was anteroinferiorly positioned. 2(13.3%) had clicking in right TMJ region, in which both were anterosuperiorly positioned (100.0%). 1(6.7%) had clicking in both right and left TMJ region, was anterosuperiorly positioned(100.0%). 1(6.7%) had pain and clicking in the right TMJ region, which was anteriorly positioned (100.0%). 1(6.7%) had lock jaw which was anteriorly positioned (100.0%). The Correlation between chief complaint and disc position in close mouth in right TMJ was insignificant with a P value of 0.081.

Table-25 and Graph-25 shows the Correlation between chief complaint and DPCMLT

In the total of 15(100%) subjects, 7(46.7%) had pain in the left TMJ region, 3 (42.9%) were anteriorly positioned and 4(57.1%) were anterosuperiorly positioned. 1(6.7%) had pain in the right and left TMJ region, which was anterosuperiorly positioned (100.0%). 2(13.3%) had clicking in left TMJ region, 1(50.0%) was anterosuperiorly positioned and 1(50.0%) was anteriorly positioned. 2(13.3%) had clicking in right TMJ region, in which both were superiorly positioned (100.0%). 1(6.7%) had clicking in both right and left TMJ region, was anterosuperiorly positioned(100.0%). 1(6.7%) had pain and clicking in the right TMJ region, which was anterosuperiorly positioned(100.0%). 1(6.7%) had lock jaw which was anteriorly positioned(100.0%). The Correlation between chief complaint and disc position in close mouth in left TMJ was insignificant with a P value of 0.084.

Table-26 and Graph-26 shows the Correlation between mouth opening and DPCMLT

In the total of 15(100%) subjects, 7(46.7%) had mouth opening between 30 and 40 mm, in which 4(57.1%) had disc positioned anteriorly and 3(42.9%) had disc positioned anterosuperiorly, 8(53.3%) had mouth opening above 40mm, 1(12.5%) had disc positioned anteriorly, 5(62.5%) had disc positioned anterosuperiorly and 2(25%) had disc positioned superiorly. The Correlation between mouth opening and disc position in close mouth in left TMJ was insignificant with a P value of 0.119.

Table-27 and Graph-27 shows the Correlation between mouth opening and DPCMRT

In the total of 15(100%) subjects, 7(46.7%) had mouth opening between 30 and 40 mm, in which 1(14.3%) had disc positioned anteriorly, 4(57.1%) had disc positioned anterosuperiorly and 2(28.6%) had disc positioned superiorly. 8(53.3%) had mouth opening above 40mm, in which 1(12.5%) had disc positioned anteriorly, 4(50%) had disc positioned anterosuperiorly 2(25%) had disc positioned superiorly and 1(12.5%) had disc positioned anteroinferiorly. The Correlation between mouth opening and disc position in close mouth in right TMJ was insignificant with a P value of 0.816.

Table-28 and Graph-28 shows the Correlation between mouth opening and DPOMLT

In the total of 15(100%) subjects, 7(46.7%) had mouth opening between 30 and 40 mm, in which 1(14.3%) had disc positioned anteriorly and 6(85.7%) had disc positioned posteriorly, 8(53.3%) had mouth opening above 40mm, in which 1(12.5%) had disc positioned anteriorly and 7(87.5%) had disc positioned posteriorly. The Correlation between mouth opening and disc position in open mouth in left TMJ was insignificant with a P value of 0.733.

Table-29 and Graph-29 shows the Correlation between mouth opening and DPOMRT

In the total of 15(100%) subjects, 7(46.7%) had mouth opening between 30 and 40 mm, in which 2(28.6%) had disc positioned anteriorly and 5(71.4%) had disc positioned posteriorly, 8(53.3%) had mouth opening above 40mm, in which all(100%) of them had disc positioned posteriorly. The

Correlation between mouth opening and disc position in open mouth in right TMJ was insignificant with a P value of 0.104.

Table-30 and Graph-30 shows the Correlation between palpation and AERT

In the total of 15(100%) subjects, 2(13.3%) had pain in left TMJ, in which both(100.0%) of them had sigmoid shape. 1(6.7%) had pain in right TMJ, had deformed shape(100.0%). 1(6.7%) had pain in right and left TMJ, had sigmoid shape(100.0%). 6(40.0%) had pain and clicking in the left TMJ, in which 5(83.3%) had sigmoid shape and 1(16.7%) had box shape. 2(13.3%) had pain and clicking in the right TMJ, in which both(100.0%) of them had sigmoid shape. 1(6.7%) had pain and clicking in the left and right TMJ, had sigmoid shape(100.0%). 1(6.7%) had pain and crepitus in the left TMJ, had sigmoid shape(100.0%). 1(6.7%) had pain and crepitus in the right TMJ had flattened shape(100.0%). The Correlation between palpation and articular eminence in right TMJ was insignificant with a P value of 0.066.

Table-31 and Graph-31 shows the Correlation between palpation and AELT

In the total of 15(100%) subjects, 2(13.3%) had pain in left TMJ, in which 1(50.0%) had sigmoid and 1(50.0%) had box shape. 1(6.7%) had pain in right TMJ, who had box shape(100.0%) 1(6.7%) had pain in right and left TMJ, had sigmoid shape(100.0%). 6(40.0%) had pain and clicking in the left TMJ, in which 4(66.7%) had sigmoid shape and 2(33.3%) had flattened shape. 2(13.3%) had pain and clicking in the right TMJ, in which 1(50.0%) had sigmoid and 1(50.0%) had box shape. 1(6.7%) had pain and clicking in the left and right TMJ, had sigmoid shape(100.0%). 1(6.7%) had pain and crepitus in the left TMJ, had flattened shape(100.0%). 1(6.7%) had pain and crepitus in the right TMJ had sigmoid shape(100.0%). The Correlation between palpation and articular eminence in left TMJ was insignificant with a P value of 0.417.

Table-32 and Graph-32 shows the Correlation between palpation and DMRT

In the total of 15(100%) subjects, 2(13.3%) had pain in left TMJ, in which 1(50.0%) had biconcave and 1(50.0%) had biplanar disc morphology.

1(6.7%) had pain in right TMJ, had biconcave disc morphology(100.0%). 1(6.7%) had pain in right and left TMJ, had biconcave disc morphology(100.0%). 6(40.0%) had pain and clicking in the left TMJ, in which 5(83.3%) had biconcave disc morphology and 1(16.7%) had biconvex disc morphology. 2(13.3%) had pain and clicking in the right TMJ, in which 1(50.0%) had biconcave and 1(50.0%) had biplanar disc morphology. 1(6.7%) had pain and clicking in the left and right TMJ, had biconcave disc morphology(100.0%). 1(6.7%) had pain and crepitus in the left TMJ, had biplanar disc morphology(100.0%). 1(6.7%) had pain and crepitus in the right TMJ had biplanar disc morphology(100.0%). The Correlation between palpation and disc morphology in right TMJ was insignificant with a P value of 0.686.

Table-33 and Graph-33 shows the Correlation between palpation and DMRT

In the total of 15(100%) subjects, 2(13.3%) had pain in left TMJ, in which 1(50.0%) had biconcave and 1(50.0%) had biplanar disc morphology. 1(6.7%) had pain in right TMJ, had biconvex disc morphology(100.0%).

1(6.7%) had pain in right and left TMJ, had biconcave disc morphology(100.0%). 6(40.0%) had pain and clicking in the left TMJ, in which 3(50.0%) had biconcave and 2(33.3%) had biplanar and 1(16.7%) had folded disc morphology. 2(13.3%) had pain and clicking in the right TMJ, in which both had biconcave disc morphology(100.0%). 1(6.7%) had pain and clicking in the left and right TMJ, had biconcave disc morphology(100.0%). 1(6.7%) had pain and crepitus in the left TMJ, had biconcave disc morphology(100.0%). 1(6.7%) had pain and crepitus in the right TMJ had biconcave disc morphology (100.0%). The Correlation between palpation and disc morphology in left TMJ was insignificant with a P value of 0.500.

Table-34 and Graph-34 shows the Correlation between palpation and DPOMRT

In the total of 15(100%) subjects, 2(13.3%) had pain in left TMJ in which 1(50%) had disc positioned anteriorly and 1(50%) had disc positioned posteriorly, 1(6.7%) had pain in right TMJ who had disc positioned anteriorly(100%), 1(6.7%) had pain in right and left TMJ who had disc positioned posteriorly(100%), 6(40.0%) had pain and clicking in the left TMJ in which all of them had disc positioned posteriorly(100%), 2(13.3%) had pain and clicking in the right TMJ who had disc positioned posteriorly(100%), 1(6.7%) had pain and clicking in the left and right TMJ who had disc positioned posteriorly(100%), 1(6.7%) had pain and crepitus in the left TMJ who had disc positioned posteriorly(100%) , 1(6.7%) had pain and crepitus in the right TMJ who had disc positioned posteriorly(100%). The Correlation between palpation and disc position in open mouth in right TMJ was insignificant with a P value of 0.154.

Table-35 and Graph-35 shows the Correlation between palpation and DPOMLT

In the total of 15(100%) subjects, 2(13.3%) had pain in left TMJ both(100%) of them had disc positioned posteriorly, 1(6.7%) had pain in right TMJ had disc positioned anteriorly(100%), 1(6.7%) had pain in right and left TMJ had disc positioned posteriorly(100%), 6(40.0%) had pain and clicking in the left TMJ, in which 1(16.7%) had disc positioned anteriorly,5(83.3%) had disc positioned posteriorly, 2(13.3%) had pain and clicking in the right TMJ in which both(100%) had disc positioned posteriorly, 1(6.7%) had pain and clicking in the left and right TMJ had disc positioned posteriorly(100%), 1(6.7%) had pain and crepitus in the left TMJ had disc positioned posteriorly(100%), 1(6.7%) had pain and crepitus in the right TMJ had disc positioned posteriorly(100%). The Correlation between palpation and disc position in open mouth in left TMJ was insignificant with a P value of 0.352.

Table-36 and Graph-36 shows the Correlation between palpation and DPCMRT

In the total of 15(100%) subjects, 2(13.3%) had pain in left TMJ in which 1(50%) had disc positioned anterosuperiorly and 1(50%) had disc positioned superiorly, 1(6.7%) had pain in right TMJ had disc positioned anteriorly(100%) , 1(6.7%) had pain in right and left TMJ had disc positioned anterosuperiorly (100%), 6(40.0%) had pain and clicking in the left TMJ in which 3(50%) had disc positioned anterosuperiorly, 2(33.3%) had disc positioned superiorly and 1(16.7%) had disc positioned anteroinferiorly, 2(13.3%) had pain and clicking in the right TMJ in which both had disc positioned anterosuperiorly (100%), 1(6.7%) had pain and clicking in the left and right TMJ had disc positioned anterosuperiorly (100%), 1(6.7%) had pain and crepitus in the left TMJ had disc positioned superiorly(100%), 1(6.7%) had pain and crepitus in the right TMJ had disc positioned anteriorly(100%). The Correlation between palpation and disc position in close mouth in right TMJ was insignificant with a P value of 0.407.

Table-37 and Graph-37 shows the Correlation between palpation and DPCMLT

In the total of 15(100%) subjects, 2(13.3%) had pain in left TMJ in which 1(50%) had disc positioned anterosuperiorly and 1(50%) had disc positioned anteriorly, 1(6.7%) had pain in right TMJ had disc positioned anteriorly(100%) , 1(6.7%) had pain in right and left TMJ had disc positioned anteriosuperiorly(100%), 6(40.0%) had pain and clicking in the left TMJ in which 3(50.0%) had disc positioned anterosuperiorly and 3(50.0%) had disc positioned anteriorly , 2(13.3%) had pain and clicking in the right TMJ in which both(100%) of them had disc positioned superiorly, 1(6.7%) had pain and clicking in the left and right TMJ had disc positioned anteriosuperiorly(100%) , 1(6.7%) had pain and crepitus in the left TMJ had disc positioned anteriosuperiorly(100%), 1(6.7%) had pain and crepitus in the right TMJ had disc positioned anteriosuperiorly(100%). The Correlation between palpation and disc position in close mouth in left TMJ was insignificant with a P value of 0.122

Table-38 and Graph-38 shows the Correlation between auscultation and AERT

In the total of 15(100%) subjects, 4(26.7%) did not have any sounds, in which 3(75.0%) had sigmoid and 1(25.0%) had deformed shape. 6(40.0%) had clicking in left TMJ, in which 5(83.3%) had sigmoid and 1(16.7%) had box shape. 2(13.3%) had clicking in right TMJ, in which both(100.0%) had sigmoid shape. 1(6.7%) had clicking in left and right TMJ, had sigmoid shape(100.0%). 1(6.7%) had crepitus in left TMJ, had sigmoid shape(100.0%). 1(6.7%) had crepitus in right TMJ, had flattened shape(100.0%). The Correlation between auscultation and articular eminence morphology in right TMJ was insignificant with a P value of 0.202

Table-39 and Graph-39 shows the Correlation between auscultation and AELT

In the total of 15(100%) subjects, 4(26.7%) did not have any sounds, in which 2(50.0%) had sigmoid and 2(50.0%) had box shape, 6(40.0%) had clicking in left TMJ, in which 4(66.7%) had sigmoid and 2(33.3%) had flattened shape, 2(13.3%) had clicking in right TMJ, in which 1(50.0%) had sigmoid and 1(50.0%) had box shape, 1(6.7%) had clicking in left and right TMJ, had sigmoid shape(100%), 1(6.7%) had crepitus in left TMJ, had flattened shape(100%) 1(6.7%) had crepitus in right TMJ had sigmoid shape(100%). The Correlation between auscultation and articular eminence morphology in left TMJ was insignificant with a P value of 0.349

Table-40 and Graph-40 shows the Correlation between auscultation and DMRT

In the total of 15(100%) subjects, 4(26.7%) did not have any sounds in which 3(75%) had biconcave and 1(25%) had biplanar disc morphology, 6(40.0%) had clicking in left TMJ in which 5(83.3%) had biconcave and 1(16.7%) had biconvex disc morphology, 2(13.3%) had clicking in right TMJ in which 1(50%) had biconcave and 1(50%) had biplanar disc morphology , 1(6.7%) had clicking in left and right TMJ who had biconcave disc morphology(100%) , 1(6.7%) had crepitus in left TMJ who had biplanar disc morphology(100%) , 1(6.7%) had crepitus in right TMJ who had biplanar disc morphology(100%). The Correlation between auscultation and disc morphology in right TMJ was insignificant with a P value of 0.468.

Table-41 and Graph-41 shows the Correlation between auscultation and DMLT

In the total of 15(100%) subjects, 4(26.7%) did not have any sounds in which 2(50%) had biconcave and 1(25%) had biplanar disc morphology and 1(25%) had biconvex disc morphology, 6(40.0%) had clicking in left TMJ in which 3(50%) had biconcave and 2(33.3%) had biplanar and 1(16.7%) had folded disc morphology, 2(13.3%) had clicking in right TMJ in which both(100%) had biconcave disc morphology , 1(6.7%) had clicking in left and right TMJ who had biconcave disc morphology(100%) , 1(6.7%) had crepitus in left TMJ who had biconcave disc morphology(100%) , 1(6.7%) had crepitus in right TMJ who had biconcave disc morphology(100%). The Correlation between auscultation and disc morphology in left TMJ was insignificant with a P value of 0.955.

Table-42 and Graph-42 shows the Correlation between auscultation and DPOMRT

In the total of 15(100%) subjects, 4(26.7%) did not have any sounds in which 2(50%) had disc positioned anteriorly and 2(50%) had disc positioned posteriorly , 6(40.0%) had clicking in left TMJ in which all of them(100%) had disc positioned posteriorly , 2(13.3%) had clicking in right TMJ in which all of them(100%) had disc positioned posteriorly, 1(6.7%) had clicking in left and right TMJ who had disc positioned posteriorly(100%), 1(6.7%) had crepitus in left TMJ who had disc positioned posteriorly(100%), 1(6.7%) had crepitus in right TMJ who had disc positioned posteriorly(100%). The Correlation between auscultation and disc position in open mouth in right TMJ was insignificant with a P value of 0.274.

Table-43 and Graph-43 shows the Correlation between auscultation and DPOMLT

In the total of 15(100%) subjects, 4(26.7%) did not have any sounds in which 1(25%) had disc positioned anteriorly and 3(75%) had disc positioned posteriorly , 6(40.0%) had clicking in left TMJ in which 1(16.7%) had disc positioned anteriorly and 5(83.3%) had disc positioned posteriorly, 2(13.3%) had clicking in right TMJ in which all of them(100%) had disc positioned posteriorly, 1(6.7%) had clicking in left and right TMJ who had disc positioned posteriorly(100%), 1(6.7%) had crepitus in left TMJ who had disc positioned posteriorly(100%), 1(6.7%) had crepitus in right TMJ who had disc positioned posteriorly(100%). The Correlation between auscultation and disc position in open mouth in left TMJ was insignificant with a P value of 0.935.

Table-44 and Graph-44 shows the Correlation between auscultation and DPCMRT

In the total of 15(100%) subjects, 4(26.7%) did not have any sounds in which 1(25%) had disc positioned anteriorly and 2(50%) had disc positioned anterosuperiorly and 1(25%) had disc positioned superiorly , 6(40.0%) had clicking in left TMJ in which 3(50%) had disc positioned anterosuperiorly, 2(33.3%) had disc positioned superiorly and 1(16.7%) had disc positioned anteroinferiorly, 2(13.3%) had clicking in right TMJ in which all of them(100%) had disc positioned anterosuperiorly, 1(6.7%) had clicking in left and right TMJ who had disc positioned anterosuperiorly 100%), 1(6.7%) had crepitus in left TMJ who had disc positioned superiorly(100%), 1(6.7%) had crepitus in right TMJ who had disc positioned anteriorly(100%). The Correlation between auscultation and disc position in close mouth in right TMJ was insignificant with a P value of 0.497.

Table-45 and Graph-45 shows the Correlation between auscultation and DPCMLT

In the total of 15(100%) subjects, 4(26.7%) did not have any sounds in which 2(50%) had disc positioned anteriorly and 2(50%) had disc positioned anterosuperiorly, 6(40.0%) had clicking in left TMJ in which 3(50%) had disc positioned anteriorly and 3(50%) had disc positioned anterosuperiorly, 2(13.3%) had clicking in right TMJ in which all of them(100%) had disc positioned superiorly, 1(6.7%) had clicking in left and right TMJ who had disc positioned anterosuperiorly (100%), 1(6.7%) had crepitus in left TMJ who had disc positioned anterosuperiorly (100%), 1(6.7%) had crepitus in right TMJ who had disc positioned anterosuperiorly (100%). The Correlation between auscultation and disc position in close mouth in left TMJ was insignificant with a P value of 0.058.

Table-46 and Graph-46 shows the Correlation between DMRT and DPOMRT

In the total of 15(100%) MRI images examined for disc morphology in right TMJ, 10(66.7%) were biconcave, in which 1(10.0%) was anteriorly positioned and 9(90.0%) were posteriorly positioned 4(26.7%) were biplanar, in which 1(25.0%) was anteriorly positioned and 3(75.0%) were posteriorly positioned. 1(6.7%) was biconvex in shape, which was posteriorly positioned (100.0). The Correlation between disc morphology of right TMJ and disc position in open mouth in right TMJ was insignificant with a P value of 0.084.

Table-47 and Graph-47 shows the Correlation between DMRT and DPCMRT

In the total of 15(100%) MRI images examined for disc morphology in right TMJ, 10(66.7%) were biconcave, in which 1(10.0%) was anteriorly positioned and 6(60.0%) were anterosuperiorly positioned, 3(30.0%) were superiorly positioned. 4(26.7%) were biplanar, in which 1(25.0%) was anteriorly positioned and 2(50.0%) were anterosuperiorly positioned 1(25.0%) was superiorly positioned. 1(6.7%) was biconvex in shape, which was anteroinferiorly positioned (100.0%). The Correlation between disc morphology of right TMJ and disc position in close mouth in right TMJ was insignificant with a P value of 0.016.

Table-48 and Graph-48 shows the Correlation between DMLT and DPOMLT

In the total of 15(100%) MRI images examined for disc morphology in left TMJ, 10(66.7%) were biconcave, in which all (100.0%) were posteriorly positioned. 3(20.0%) were biplanar, in which all (100.0%) were posteriorly positioned. 1(6.7%) was biconvex, which was anteriorly positioned(100.0%)

and 1(6.7%) was folded in shape which was anteriorly positioned(100.0%). The Correlation between disc morphology of left TMJ and disc position in open mouth in left TMJ was significant with a P value of 0.002.

Table-49 and Graph-49 shows the Correlation between DMLT and DPCMLT

In the total of 15(100%) MRI images examined for disc morphology in left TMJ, 10(66.7%) were biconcave, 2(20.0%) were anteriorly positioned, 6(60.0%) were anterosuperiorly positioned and 2(20.0%) were superiorly positioned. 3(20.0%) were biplanar, 2(66.7%) were anteriorly positioned and 1(33.3%) was anterosuperiorly positioned. 1(6.7%) was biconvex, which was anteriorly positioned(100.0%) and 1(6.7%) was folded in shape which was anteriosuperiorly positioned(100.0%). The Correlation between disc morphology of left TMJ and disc position in close mouth in left TMJ was insignificant with a P value of 0.48.

Table-50 and Graph-50 shows the Correlation between DPOMRT and DPCMRT

In the total of 15(100%) MRI images examined for disc position in open mouth in right TMJ, 2(13.3%) were anteriorly positioned in which 1(50.0%) was anteriorly positioned and 1(50.0%) was anteriosuperiorly positioned in close mouth. 13(86.7%) were posteriorly positioned in which 1(7.7%) was anteriorly positioned and 7(53.8%) was anteriosuperiorly positioned, 4(30.8%) superiorly positioned and 1(7.7%) was anteroinferiorly positioned in close mouth. The Correlation between disc position in open mouth of right TMJ and disc position in close mouth in right TMJ was insignificant with a P value of 0.376.

Table-51 and Graph-51 shows the Correlation between DPOMLT and DPCMLT

In the total of 15(100%) MRI images examined for disc position in open mouth in left TMJ, 2(13.3%) were anteriorly positioned, in which 1(50.0%) was anteriorly positioned and 1(50.0%) was anteriosuperiorly positioned in close mouth. 13(86.7%) were posteriorly positioned in which

4(30.8%) was anteriorly positioned and 7(53.8%) was anteriosuperiorly positioned, and 2(15.4%) were superiorly positioned in close mouth. The Correlation between disc position in open mouth of left TMJ and disc position in close mouth in left TMJ was insignificant with a P value of 0.777.

Table-52 and Graph-52 shows the Correlation between DPOMRT and DPOMLT

In the total of 15(100%) MRI images examined for disc position in open mouth in right TMJ, 2(13.3%) were anteriorly positioned in which 1(50%) had the disc positioned anteriorly and 1(50%) had the disc positioned posteriorly in the left side. 13(86.7%) were posteriorly positioned in which 1(7.7%) had the disc positioned anteriorly and 12(92.3%) had the disc positioned posteriorly in the left side. The Correlation between disc position in open mouth of right TMJ and disc position in open mouth in left TMJ was insignificant with a P value of 0.101.

Table-53 and Graph-53 shows the Correlation between DPCMRT and DPCMLT

In the total of 15(100%) MRI images examined for disc position in close mouth in right TMJ, 2(13.3%) were anteriorly positioned, in which 1(50%) had the disc positioned anteriorly and 1(50%) had the disc positioned anterosuperiorly in the left side. 8(53.3%) were anterosuperiorly positioned, in which 3(37.5%) had the disc positioned anteriorly, 3(37.5%) had the disc positioned anterosuperiorly and 2(25%) had the disc positioned superiorly in the left side. 4(26.6%) were superiorly positioned in which all (100%) had the disc positioned anterosuperiorly in the left side and 1(6.7%) was anteroinferiorly positioned, who (100%) had the disc positioned anteriorly in the left side. The Correlation between disc position in close mouth of right TMJ and disc position in close mouth in left TMJ was insignificant with a P value of 0.305.

Table 1: Distribution of subjects according to sex

	Frequency	Percent
Male	3	20.0
Female	12	80.0
Total	15	100.0

Table 2: Distribution of subjects according to chief complaint

	Frequency	Percent
Pain left	7	46.7
Pain RT LT	1	6.7
Clicking left	2	13.3
Clicking right	2	13.3
Clicking RT LT	1	6.7
Pain & click right	1	6.7
Lock jaw	1	6.7
Total	15	100.0

Table 3: Distribution of subjects according to mouth opening

Mouth opening	Frequency	Percent
30-40	7	46.7
Above 40	8	53.3
Total	15	100.0

Table 4: Distribution of subjects according to deviation

Deviation	Frequency	Percent
Absent	9	60.0
Deviation right	2	13.3
Deviation left	4	26.7
Total	15	100.0

Table 5: Distribution of subjects according to palpatory findings

Palpation	Frequency	Percent
Pain left	2	13.3
Pain right	1	6.7
Pain right and left	1	6.7
Pain and Clicking left	6	40.0
Pain and Clicking right	2	13.3
Pain and Clicking right and left	1	6.7
Pain and Crepitus left	1	6.7
Pain and Crepitus right	1	6.7
Total	15	100.0

Table 6: Distribution of subjects according to auscultatory findings

Auscultation	Frequency	Percent
No sounds	4	26.7
Clicking left	6	40.0
Clicking right	2	13.3
Clicking right and left	1	6.7
Crepitus left	1	6.7
Crepitus right	1	6.7
Total	15	100.0

Table 7: Distribution of articular eminence morphology in right TMJ

AERT	Frequency	Percent
Sigmoid	12	80.0
Flattened	1	6.7
Box	1	6.7
Deformed	1	6.7
Total	15	100.0

Table 8: Distribution of articular eminence morphology in left TMJ

AELT	Frequency	Percent
Sigmoid	9	60.0
Flattened	3	20.0
Box	3	20.0
Total	15	100.0

Table 9: Distribution of disc morphology in right TMJ

DMRT	Frequency	Percent
Biconcave	10	66.7
Biplanar	4	26.7
Biconvex	1	6.7
Total	15	100.0

Table 10: Distribution of disc morphology in left TMJ

DMLT	Frequency	Percent
Biconcave	10	66.7
Biplanar	3	20.0
Biconvex	1	6.7
Folded	1	6.7
Total	15	100.0

Table 11: Distribution of disc position in open mouth in right TMJ

DPOMRT	Frequency	Percent
Anterior	2	13.3
Posterior	13	86.7
Total	15	100.0

Table 12: Distribution of disc position in open mouth in left TMJ

DPOMLT	Frequency	Percent
Anterior	2	13.3
Posterior	13	86.7
Total	15	100.0

Table 13: Distribution of disc position in close mouth in right TMJ

DPCMRT	Frequency	Percent
Anterior	2	13.3
Antero superior	8	53.3
Superior	4	26.7
Antero inferior	1	6.7
Total	15	100.0

Table 14: Distribution of disc position in close mouth in left TMJ

DPCMLT	Frequency	Percent
Anterior	5	33.3
Anterosuperior	8	53.3
Superior	2	13.3
Total	15	100.0

Table 15: Correlation between chief complaint and mouth opening

Chief complaint		Mouth opening		Total
		30-40	**Above 40**	
Pain left	Count	5	2	7
	% within Chief complaint	71.4%	28.6%	100.0%
	% within Mouth opening	71.4%	25.0%	46.7%
Pain RT LT	Count	0	1	1
	% within Chief complaint	.0%	100.0%	100.0%
	% within Mouth opening	.0%	12.5%	6.7%
Clicking left	Count	0	2	2
	% within Chief complaint	.0%	100.0%	100.0%
	% within Mouth opening	.0%	25.0%	13.3%
Clicking right	Count	0	2	2
	% within Chief complaint	.0%	100.0%	100.0%
	% within Mouth opening	.0%	25.0%	13.3%
Clicking RT LT	Count	1	0	1
	% within Chief complaint	100.0%	.0%	100.0%
	% within Mouth opening	14.3%	.0%	6.7%
Pain & click right	Count	0	1	1
	% within Chief complaint	.0%	100.0%	100.0%
	% within Mouth opening	.0%	12.5%	6.7%
Lock jaw	Count	1	0	1
	% within Chief complaint	100.0%	.0%	100.0%
	% within Mouth opening	14.3%	.0%	6.7%
Total	Count	7	8	15
	% within Chief complaint	46.7%	53.3%	100.0%
	% within Mouth opening	100.0%	100.0%	100.0%

P- 0.15

Table 16: Correlation between chief complaint and palpatory findings

Chief complaint	Palpation								Total
	Pain left	Pain right	Pain right and left	Pain and clicking left	Pain and click right	Pain and click right and left	Pain and crepitus left	Pain and crepitus right	
Pain left	2	0	0	4	0	0	1	0	7
	28.6%	.0%	.0%	57.1%	.0%	.0%	14.3%	.0%	100.0%
	100.0%	.0%	.0%	66.7%	.0%	.0%	100.0%	.0%	46.7%
Pain RT LT	0	0	1	0	0	0	0	0	1
	.0%	.0%	100.0%	.0%	.0%	.0%	.0%	.0%	100.0%
	.0%	.0%	100.0%	.0%	.0%	.0%	.0%	.0%	6.7%
Clicking left	0	0	0	2	0	0	0	0	2
	.0%	.0%	.0%	100.0%	.0%	.0%	.0%	.0%	100.0%
	.0%	.0%	.0%	33.3%	.0%	.0%	.0%	.0%	13.3%
Clicking right	0	0	0	0	2	0	0	0	2
	.0%	.0%	.0%	.0%	100.0%	.0%	.0%	.0%	100.0%
	.0%	.0%	.0%	.0%	100.0%	.0%	.0%	.0%	13.3%
Clicking RT LT	0	0	0	0	0	1	0	0	1
	.0%	.0%	.0%	.0%	.0%	100.0%	.0%	.0%	100.0%
	.0%	.0%	.0%	.0%	.0%	100.0%	.0%	.0%	6.7%
Pain & click right	0	0	0	0	0	0	0	1	1
	.0%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%	100.0%
	.0%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%	6.7%
Lock jaw	0	1	0	0	0	0	0	0	1
	.0%	100.0%	.0%	.0%	.0%	.0%	.0%	.0%	100.0%
	.0%	100.0%	.0%	.0%	.0%	.0%	.0%	.0%	6.7%
Total	2	1	1	6	2	1	1	1	15
	13.3%	6.7%	6.7%	40.0%	13.3%	6.7%	6.7%	6.7%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

P – 0.001

Table 17: Correlation between chief complaint and auscultatory findings

Chief complaint	Auscultation						Total
	No sounds	Clicking left	Clicking right	Clicking right and left	Crepitus left	Crepitus right	
Pain left	2	4	0	0	1	0	7
	28.6%	57.1%	.0%	.0%	14.3%	.0%	100.0%
	50.0%	66.7%	.0%	.0%	100.0%	.0%	46.7%
Pain RT LT	1	0	0	0	0	0	1
	100.0%	.0%	.0%	.0%	.0%	.0%	100.0%
	25.0%	.0%	.0%	.0%	.0%	.0%	6.7%
Clicking left	0	2	0	0	0	0	2
	.0%	100.0%	.0%	.0%	.0%	.0%	100.0%
	.0%	33.3%	.0%	.0%	.0%	.0%	13.3%
Clicking right	0	0	2	0	0	0	2
	.0%	.0%	100.0%	.0%	.0%	.0%	100.0%
	.0%	.0%	100.0%	.0%	.0%	.0%	13.3%
Clicking RT LT	0	0	0	1	0	0	1
	.0%	.0%	.0%	100.0%	.0%	.0%	100.0%
	.0%	.0%	.0%	100.0%	.0%	.0%	6.7%
Pain & click right	0	0	0	0	0	1	1
	.0%	.0%	.0%	.0%	.0%	100.0%	100.0%
	.0%	.0%	.0%	.0%	.0%	100.0%	6.7%
Lock jaw	1	0	0	0	0	0	1
	100.0%	.0%	.0%	.0%	.0%	.0%	100.0%
	25.0%	.0%	.0%	.0%	.0%	.0%	6.7%
Total	4	6	2	1	1	1	15
	26.7%	40.0%	13.3%	6.7%	6.7%	6.7%	100.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

P- 0.007

Table 18: Correlation between chief complaint and AERT

Chief complaint		**AE- RT**				**Total**
		Sigmoid	**Flattened**	**Box**	**Deformed**	
Pain left	Count	7	0	0	0	7
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within AE- RT	58.3%	.0%	.0%	.0%	46.7%
Pain RT LT	Count	1	0	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within AE- RT	8.3%	.0%	.0%	.0%	6.7%
Clicking left	Count	1	0	1	0	2
	% within Chief complaint	50.0%	.0%	50.0%	.0%	100.0%
	% within AE- RT	8.3%	.0%	100.0%	.0%	13.3%
Clicking right	Count	2	0	0	0	2
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within AE- RT	16.7%	.0%	.0%	.0%	13.3%
Clicking RT LT	Count	1	0	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within AE- RT	8.3%	.0%	.0%	.0%	6.7%
Pain & click right	Count	0	1	0	0	1
	% within Chief complaint	.0%	100.0%	.0%	.0%	100.0%
	% within AE- RT	.0%	100.0%	.0%	.0%	6.7%
Lock jaw	Count	0	0	0	1	1
	% within Chief complaint	.0%	.0%	.0%	100.0%	100.0%
	% within AE- RT	.0%	.0%	.0%	100.0%	6.7%
Total	Count	12	1	1	1	15
	% within Chief complaint	80.0%	6.7%	6.7%	6.7%	100.0%
	% within AE- RT	100.0%	100.0%	100.0%	100.0%	100.0%

P – 0.005

Table 19: Correlation between chief complaint and AELT

Chief complaint		AE-LT			Total
		Sigmoid	Flattened	Box	
Pain left	Count	3	3	1	7
	% within Chief complaint	42.9%	42.9%	14.3%	100.0%
	% within AE-LT	33.3%	100.0%	33.3%	46.7%
Pain RT LT	Count	1	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	100.0%
	% within AE-LT	11.1%	.0%	.0%	6.7%
Clicking left	Count	2	0	0	2
	% within Chief complaint	100.0%	.0%	.0%	100.0%
	% within AE-LT	22.2%	.0%	.0%	13.3%
Clicking right	Count	1	0	1	2
	% within Chief complaint	50.0%	.0%	50.0%	100.0%
	% within AE-LT	11.1%	.0%	33.3%	13.3%
Clicking RT LT	Count	1	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	100.0%
	% within AE-LT	11.1%	.0%	.0%	6.7%
Pain & click right	Count	1	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	100.0%
	% within AE-LT	11.1%	.0%	.0%	6.7%
Lock jaw	Count	0	0	1	1
	% within Chief complaint	.0%	.0%	100.0%	100.0%
	% within AE-LT	.0%	.0%	33.3%	6.7%
Total	Count	9	3	3	15
	% within Chief complaint	60.0%	20.0%	20.0%	100.0%
	% within AE-LT	100.0%	100.0%	100.0%	100.0%

P – 0.533

Table 20: Correlation between chief complaint and DMRT

Chief complaint		DM-RT			Total
		Biconcave	**Biplanar**	**Biconvex**	
Pain left	Count	5	2	0	7
	% within Chief complaint	71.4%	28.6%	.0%	100.0%
	% within DM-RT	50.0%	50.0%	.0%	46.7%
Pain RT LT	Count	1	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	100.0%
	% within DM-RT	10.0%	.0%	.0%	6.7%
Clicking left	Count	1	0	1	2
	% within Chief complaint	50.0%	.0%	50.0%	100.0%
	% within DM-RT	10.0%	.0%	100.0%	13.3%
Clicking right	Count	1	1	0	2
	% within Chief complaint	50.0%	50.0%	.0%	100.0%
	% within DM-RT	10.0%	25.0%	.0%	13.3%
Clicking RT LT	Count	1	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	100.0%
	% within DM-RT	10.0%	.0%	.0%	6.7%
Pain & click right	Count	0	1	0	1
	% within Chief complaint	.0%	100.0%	.0%	100.0%
	% within DM-RT	.0%	25.0%	.0%	6.7%
Lock jaw	Count	1	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	100.0%
	% within DM-RT	10.0%	.0%	.0%	6.7%
Total	Count	10	4	1	15
	% within Chief complaint	66.7%	26.7%	6.7%	100.0%
	% within DM-RT	100.0%	100.0%	100.0%	100.0%

P – 0.47

Table 21: Correlation between chief complaint and DMLT

Chief complaint		**DM-LT**				**Total**
		Biconcave	**Biplanar**	**Biconvex**	**Folded**	
Pain left	Count	5	2	0	0	7
	% within Chief complaint	71.4%	28.6%	.0%	.0%	100.0%
	% within DM-LT	50.0%	66.7%	.0%	.0%	46.7%
Pain RT LT	Count	1	0	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within DM-LT	10.0%	.0%	.0%	.0%	6.7%
Clicking left	Count	0	1	0	1	2
	% within Chief complaint	.0%	50.0%	.0%	50.0%	100.0%
	% within DM-LT	.0%	33.3%	.0%	100.0%	13.3%
Clicking right	Count	2	0	0	0	2
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within DM-LT	20.0%	.0%	.0%	.0%	13.3%
Clicking RT LT	Count	1	0	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within DM-LT	10.0%	.0%	.0%	.0%	6.7%
Pain & click right	Count	1	0	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within DM-LT	10.0%	.0%	.0%	.0%	6.7%
Lock jaw	Count	0	0	1	0	1
	% within Chief complaint	.0%	.0%	100.0%	.0%	100.0%
	% within DM-LT	.0%	.0%	100.0%	.0%	6.7%
Total	Count	10	3	1	1	15
	% within Chief complaint	66.7%	20.0%	6.7%	6.7%	100.0%
	% within DM-LT	100.0%	100.0%	100.0%	100.0%	100.0%

P – 0.106

Table 22: Correlation between chief complaint and DPOMRT

Chief complaint		DP-OMRT		Total
		Anterior	**Posterior**	
Pain left	Count	1	6	7
	% within Chief complaint	14.3%	85.7%	100.0%
	% within DP-OMRT	50.0%	46.2%	46.7%
Pain RT LT	Count	0	1	1
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMRT	.0%	7.7%	6.7%
Clicking left	Count	0	2	2
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMRT	.0%	15.4%	13.3%
Clicking right	Count	0	2	2
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMRT	.0%	15.4%	13.3%
Clicking RT LT	Count	0	1	1
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMRT	.0%	7.7%	6.7%
Pain & click right	Count	0	1	1
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMRT	.0%	7.7%	6.7%
Lock jaw	Count	1	0	1
	% within Chief complaint	100.0%	.0%	100.0%
	% within DP-OMRT	50.0%	.0%	6.7%
Total	Count	2	13	15
	% within Chief complaint	13.3%	86.7%	100.0%
	% within DP-OMRT	100.0%	100.0%	100.0%

P – 0.27

Table 23: Correlation between chief complaint and DPOMLT

Chief complaint		DP-OMLT		Total
		Anterior	Posterior	
Pain left	Count	0	7	7
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMLT	.0%	53.8%	46.7%
Pain RT LT	Count	0	1	1
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMLT	.0%	7.7%	6.7%
Clicking left	Count	1	1	2
	% within Chief complaint	50.0%	50.0%	100.0%
	% within DP-OMLT	50.0%	7.7%	13.3%
Clicking right	Count	0	2	2
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMLT	.0%	15.4%	13.3%
Clicking RT LT	Count	0	1	1
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMLT	.0%	7.7%	6.7%
Pain & click right	Count	0	1	1
	% within Chief complaint	.0%	100.0%	100.0%
	% within DP-OMLT	.0%	7.7%	6.7%
Lock jaw	Count	1	0	1
	% within Chief complaint	100.0%	.0%	100.0%
	% within DP-OMLT	50.0%	.0%	6.7%
Total	Count	2	13	15
	% within Chief complaint	13.3%	86.7%	100.0%
	% within DP-OMLT	100.0%	100.0%	100.0%

P – 0.09

Table 24: Correlation between chief complaint and DPCMRT

Chief complaint		DP-CMRT				Total
		Anterior	**Antero superior**	**Superior**	**Antero inferior**	
Pain left	Count	0	3	4	0	7
	% within Chief complaint	.0%	42.9%	57.1%	.0%	100.0%
	% within DP-CMRT	.0%	37.5%	100.0%	.0%	46.7%
Pain RT LT	Count	0	1	0	0	1
	% within Chief complaint	.0%	100.0%	.0%	.0%	100.0%
	% within DP-CMRT	.0%	12.5%	.0%	.0%	6.7%
Clicking left	Count	0	1	0	1	2
	% within Chief complaint	.0%	50.0%	.0%	50.0%	100.0%
	% within DP-CMRT	.0%	12.5%	.0%	100.0%	13.3%
Clicking right	Count	0	2	0	0	2
	% within Chief complaint	.0%	100.0%	.0%	.0%	100.0%
	% within DP-CMRT	.0%	25.0%	.0%	.0%	13.3%
Clicking RT LT	Count	0	1	0	0	1
	% within Chief complaint	.0%	100.0%	.0%	.0%	100.0%
	% within DP-CMRT	.0%	12.5%	.0%	.0%	6.7%
Pain & click right	Count	1	0	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within DP-CMRT	50.0%	.0%	.0%	.0%	6.7%
Lock jaw	Count	1	0	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	.0%	100.0%
	% within DP-CMRT	50.0%	.0%	.0%	.0%	6.7%
Total	Count	2	8	4	1	15
	% within Chief complaint	13.3%	53.3%	26.7%	6.7%	100.0%
	% within DP-CMRT	100.0%	100.0%	100.0%	100.0%	100.0%

P – 0.081

Table 25: Correlation between chief complaint and DPCMLT

Chief complaint		DP-CMLT			Total
		Anterior	Antero superior	Superior	
Pain left	Count	3	4	0	7
	% within Chief complaint	42.9%	57.1%	.0%	100.0%
	% within DP-CMLT	60.0%	50.0%	.0%	46.7%
Pain RT LT	Count	0	1	0	1
	% within Chief complaint	.0%	100.0%	.0%	100.0%
	% within DP-CMLT	.0%	12.5%	.0%	6.7%
Clicking left	Count	1	1	0	2
	% within Chief complaint	50.0%	50.0%	.0%	100.0%
	% within DP-CMLT	20.0%	12.5%	.0%	13.3%
Clicking right	Count	0	0	2	2
	% within Chief complaint	.0%	.0%	100.0%	100.0%
	% within DP-CMLT	.0%	.0%	100.0%	13.3%
Clicking RT LT	Count	0	1	0	1
	% within Chief complaint	.0%	100.0%	.0%	100.0%
	% within DP-CMLT	.0%	12.5%	.0%	6.7%
Pain & click right	Count	0	1	0	1
	% within Chief complaint	.0%	100.0%	.0%	100.0%
	% within DP-CMLT	.0%	12.5%	.0%	6.7%
Lock jaw	Count	1	0	0	1
	% within Chief complaint	100.0%	.0%	.0%	100.0%
	% within DP-CMLT	20.0%	.0%	.0%	6.7%
Total	Count	5	8	2	15
	% within Chief complaint	33.3%	53.3%	13.3%	100.0%
	% within DP-CMLT	100.0%	100.0%	100.0%	100.0%

P – 0.084

Table 26: Correlation between mouth opening and DPCMLT

Mouthopening		DPCMLT			Total
		Anterior	Antero superior	Superior	
31-40	Count	4	3	0	7
	% within mouth opening	57.1%	42.9%	.0%	100.0%
	% within DPCMLT	80.0%	37.5%	.0%	46.7%
above 40	Count	1	5	2	8
	% within mouth opening	12.5%	62.5%	25.0%	100.0%
	% within DPCMLT	20.0%	62.5%	100.0%	53.3%
Total	Count	5	8	2	15
	% within mouth opening	33.3%	53.3%	13.3%	100.0%
	% within DPCMLT	100.0%	100.0%	100.0%	100.0%

P - 0.119

Table 27: Correlation between mouth opening and DPCMRT

Mouthopening		DPCMRT				Total
		Anterior	Antero superior	Superior	Antero inferior	
31-40	Count	1	4	2	0	7
	% within mouth opening	14.3%	57.1%	28.6%	.0%	100.0%
	% within DPCMRT	50.0%	50.0%	50.0%	.0%	46.7%
above 40	Count	1	4	2	1	8
	% within mouth opening	12.5%	50.0%	25.0%	12.5%	100.0%
	% within DPCMRT	50.0%	50.0%	50.0%	100.0%	53.3%
Total	Count	2	8	4	1	15
	% within mouth opening	13.3%	53.3%	26.7%	6.7%	100.0%
	% within DPCMRT	100.0%	100.0%	100.0%	100.0%	100.0%

P - 0.816

Table 28: Correlation between mouth opening and DPOMLT

Mouth opening		DPOMLT		Total
		ANTERIOR	POSTERIOR	
31-40	Count	1	6	7
	% within mouth opening	14.3%	85.7%	100.0%
	% within DPOMLT	50.0%	46.2%	46.7%
above 40	Count	1	7	8
	% within mouth opening	12.5%	87.5%	100.0%
	% within DPOMLT	50.0%	53.8%	53.3%
Total	Count	2	13	15
	% within mouth opening	13.3%	86.7%	100.0%
	% within DPOMLT	100.0%	100.0%	100.0%

P - 0.733

Table 29: Correlation between mouth opening and DPOMRT

Mouth opening		DPOMRT		Total
		Anterior	Posterior	
31-40	Count	2	5	7
	% within mouth opening	28.6%	71.4%	100.0%
	% within DPOMRT	100.0%	38.5%	46.7%
above 40	Count	0	8	8
	% within mouth opening	.0%	100.0%	100.0%
	% within DPOMRT	.0%	61.5%	53.3%
Total	Count	2	13	15
	% within mouth opening	13.3%	86.7%	100.0%
	% within DPOMRT	100.0%	100.0%	100.0%

P - 0.200

Table 30: Correlation between palpation and AERT

Palpation		AERT				Total
		Sigmoid	Flattened	Box	Deformed	
pain lt	Count	2	0	0	0	2
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within AERT	16.7%	.0%	.0%	.0%	13.3%
pain rt	Count	0	0	0	1	1
	% within palpation	.0%	.0%	.0%	100.0%	100.0%
	% within AERT	.0%	.0%	.0%	100.0%	6.7%
pain rt, lt	Count	1	0	0	0	1
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within AERT	8.3%	.0%	.0%	.0%	6.7%
pain, clicking lt	Count	5	0	1	0	6
	% within palpation	83.3%	.0%	16.7%	.0%	100.0%
	% within AERT	41.7%	.0%	100.0%	.0%	40.0%
pain,clicking rt	Count	2	0	0	0	2
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within AERT	16.7%	.0%	.0%	.0%	13.3%
pain,clickingrt,lt	Count	1	0	0	0	1
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within AERT	8.3%	.0%	.0%	.0%	6.7%
pain,crepitus lt	Count	1	0	0	0	1
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within AERT	8.3%	.0%	.0%	.0%	6.7%
pain,crepitus rt	Count	0	1	0	0	1
	% within palpation	.0%	100.0%	.0%	.0%	100.0%
	% within AERT	.0%	100.0%	.0%	.0%	6.7%
Total	Count	12	1	1	1	15
	% within palpation	80.0%	6.7%	6.7%	6.7%	100.0%
	% within AERT	100.0%	100.0%	100.0%	100.0%	100.0%

P - 0.066

Table 31: Correlation between palpation and AELT

Palpation		AELT			Total
		Sigmoid	Flattened	Box	
pain lt	Count	1	0	1	2
	% within palpation	50.0%	.0%	50.0%	100.0%
	% within AELT	11.1%	.0%	33.3%	13.3%
pain rt	Count	0	0	1	1
	% within palpation	.0%	.0%	100.0%	100.0%
	% within AELT	.0%	.0%	33.3%	6.7%
pain rt, lt	Count	1	0	0	1
	% within palpation	100.0%	.0%	.0%	100.0%
	% within AELT	11.1%	.0%	.0%	6.7%
pain, clicking lt	Count	4	2	0	6
	% within palpation	66.7%	33.3%	.0%	100.0%
	% within AELT	44.4%	66.7%	.0%	40.0%
pain,clicking rt	Count	1	0	1	2
	% within palpation	50.0%	.0%	50.0%	100.0%
	% within AELT	11.1%	.0%	33.3%	13.3%
pain,clickingrt, lt	Count	1	0	0	1
	% within palpation	100.0%	.0%	.0%	100.0%
	% within AELT	11.1%	.0%	.0%	6.7%
pain,crepitus lt	Count	0	1	0	1
	% within palpation	.0%	100.0%	.0%	100.0%
	% within AELT	.0%	33.3%	.0%	6.7%
pain,crepitus rt	Count	1	0	0	1
	% within palpation	100.0%	.0%	.0%	100.0%
	% within AELT	11.1%	.0%	.0%	6.7%
Total	Count	9	3	3	15
	% within palpation	60.0%	20.0%	20.0%	100.0%
	% within AELT	100.0%	100.0%	100.0%	100.0%

P - 0.417

Table 32: Correlation between palpation and DMRT

Palpation		DMRT			Total
		Biconcave	Biplanar	Biconvex	
pain lt	Count	1	1	0	2
	% within palpation	50.0%	50.0%	.0%	100.0%
	% within DMRT	10.0%	25.0%	.0%	13.3%
pain rt	Count	1	0	0	1
	% within palpation	100.0%	.0%	.0%	100.0%
	% within DMRT	10.0%	.0%	.0%	6.7%
pain rt, lt	Count	1	0	0	1
	% within palpation	100.0%	.0%	.0%	100.0%
	% within DMRT	10.0%	.0%	.0%	6.7%
pain, clicking lt	Count	5	0	1	6
	% within palpation	83.3%	.0%	16.7%	100.0%
	% within DMRT	50.0%	.0%	100.0%	40.0%
pain,clicking rt	Count	1	1	0	2
	% within palpation	50.0%	50.0%	.0%	100.0%
	% within DMRT	10.0%	25.0%	.0%	13.3%
pain,clickingrt,lt	Count	1	0	0	1
	% within palpation	100.0%	.0%	.0%	100.0%
	% within DMRT	10.0%	.0%	.0%	6.7%
pain,crepitus lt	Count	0	1	0	1
	% within palpation	.0%	100.0%	.0%	100.0%
	% within DMRT	.0%	25.0%	.0%	6.7%
pain,crepitus rt	Count	0	1	0	1
	% within palpation	.0%	100.0%	.0%	100.0%
	% within DMRT	.0%	25.0%	.0%	6.7%
Total	Count	10	4	1	15
	% within palpation	66.7%	26.7%	6.7%	100.0%
	% within DMRT	100.0%	100.0%	100.0%	100.0%

P - .686

Table 33: Correlation between palpation and DMRT

Palpation		DMLT				Total
		Biconcave	Biplanar	Biconvex	Folded	
pain lt	Count	1	1	0	0	2
	% within palpation	50.0%	50.0%	.0%	.0%	100.0%
	% within DMLT	10.0%	33.3%	.0%	.0%	13.3%
pain rt	Count	0	0	1	0	1
	% within palpation	.0%	.0%	100.0%	.0%	100.0%
	% within DMLT	.0%	.0%	100.0%	.0%	6.7%
pain rt, lt	Count	1	0	0	0	1
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within DMLT	10.0%	.0%	.0%	.0%	6.7%
pain, clicking lt	Count	3	2	0	1	6
	% within palpation	50.0%	33.3%	.0%	16.7%	100.0%
	% within DMLT	30.0%	66.7%	.0%	100.0%	40.0%
pain,clicking rt	Count	2	0	0	0	2
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within DMLT	20.0%	.0%	.0%	.0%	13.3%
pain,clickingrt,lt	Count	1	0	0	0	1
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within DMLT	10.0%	.0%	.0%	.0%	6.7%
pain,crepitus lt	Count	1	0	0	0	1
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within DMLT	10.0%	.0%	.0%	.0%	6.7%
pain,crepitus rt	Count	1	0	0	0	1
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within DMLT	10.0%	.0%	.0%	.0%	6.7%
Total	Count	10	3	1	1	15
	% within palpation	66.7%	20.0%	6.7%	6.7%	100.0%
	% within DMLT	100.0%	100.0%	100.0%	100.0%	100.0%

P - 0.500

Table 34: Correlation between palpation and DPOMRT

Palpation		DPOMRT		Total
		Anterior	Posterior	
pain lt	Count	1	1	2
	% within palpation	50.0%	50.0%	100.0%
	% within DPOMRT	50.0%	7.7%	13.3%
pain rt	Count	1	0	1
	% within palpation	100.0%	.0%	100.0%
	% within DPOMRT	50.0%	.0%	6.7%
pain rt, lt	Count	0	1	1
	% within palpation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	7.7%	6.7%
pain, clicking lt	Count	0	6	6
	% within palpation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	46.2%	40.0%
pain,clicking rt	Count	0	2	2
	% within palpation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	15.4%	13.3%
pain,clickingrt,lt	Count	0	1	1
	% within palpation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	7.7%	6.7%
pain,crepitus lt	Count	0	1	1
	% within palpation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	7.7%	6.7%
pain,crepitus rt	Count	0	1	1
	% within palpation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	7.7%	6.7%
Total	Count	2	13	15
	% within palpation	13.3%	86.7%	100.0%
	% within DPOMRT	100.0%	100.0%	100.0%

P - 0.154

Table 35: Correlation between palpation and DPOMLT

Palpation		DPOMLT		Total
		Anterior	Posterior	
pain lt	Count	0	2	2
	% within palpation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	15.4%	13.3%
pain rt	Count	1	0	1
	% within palpation	100.0%	.0%	100.0%
	% within DPOMLT	50.0%	.0%	6.7%
pain rt, lt	Count	0	1	1
	% within palpation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	7.7%	6.7%
pain, clicking lt	Count	1	5	6
	% within palpation	16.7%	83.3%	100.0%
	% within DPOMLT	50.0%	38.5%	40.0%
pain,clicking rt	Count	0	2	2
	% within palpation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	15.4%	13.3%
pain,clickingrt,lt	Count	0	1	1
	% within palpation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	7.7%	6.7%
pain,crepitus lt	Count	0	1	1
	% within palpation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	7.7%	6.7%
pain,crepitus rt	Count	0	1	1
	% within palpation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	7.7%	6.7%
Total	Count	2	13	15
	% within palpation	13.3%	86.7%	100.0%
	% within DPOMLT	100.0%	100.0%	100.0%

P - 0.352

Table 36: Correlation between palpation and DPCMRT

Palpation		DPCMRT				Total
		Anterior	Antero superior	Superior	Antero inferior	
pain lt	Count	0	1	1	0	2
	% within palpation	.0%	50.0%	50.0%	.0%	100.0%
	% within DPCMRT	.0%	12.5%	25.0%	.0%	13.3%
pain rt	Count	1	0	0	0	1
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within DPCMRT	50.0%	.0%	.0%	.0%	6.7%
pain rt, lt	Count	0	1	0	0	1
	% within palpation	.0%	100.0%	.0%	.0%	100.0%
	% within DPCMRT	.0%	12.5%	.0%	.0%	6.7%
pain, clicking lt	Count	0	3	2	1	6
	% within palpation	.0%	50.0%	33.3%	16.7%	100.0%
	% within DPCMRT	.0%	37.5%	50.0%	100.0%	40.0%
pain,clicking rt	Count	0	2	0	0	2
	% within palpation	.0%	100.0%	.0%	.0%	100.0%
	% within DPCMRT	.0%	25.0%	.0%	.0%	13.3%
pain,clickingrt,lt	Count	0	1	0	0	1
	% within palpation	.0%	100.0%	.0%	.0%	100.0%
	% within DPCMRT	.0%	12.5%	.0%	.0%	6.7%
pain,crepitus lt	Count	0	0	1	0	1
	% within palpation	.0%	.0%	100.0%	.0%	100.0%
	% within DPCMRT	.0%	.0%	25.0%	.0%	6.7%
pain,crepitus rt	Count	1	0	0	0	1
	% within palpation	100.0%	.0%	.0%	.0%	100.0%
	% within DPCMRT	50.0%	.0%	.0%	.0%	6.7%
Total	Count	2	8	4	1	15
	% within palpation	13.3%	53.3%	26.7%	6.7%	100.0%
	% within DPCMRT	100.0%	100.0%	100.0%	100.0%	100.0%

P - 0.407

Table 37: Correlation between palpation and DPCMLT

Palpation		DPCMLT			Total
		Anterior	Antero superior	Superior	
pain lt	Count	1	1	0	2
	% within palpation	50.0%	50.0%	.0%	100.0%
	% within DPCMLT	20.0%	12.5%	.0%	13.3%
pain rt	Count	1	0	0	1
	% within palpation	100.0%	.0%	.0%	100.0%
	% within DPCMLT	20.0%	.0%	.0%	6.7%
pain rt, lt	Count	0	1	0	1
	% within palpation	.0%	100.0%	.0%	100.0%
	% within DPCMLT	.0%	12.5%	.0%	6.7%
pain, clicking lt	Count	3	3	0	6
	% within palpation	50.0%	50.0%	.0%	100.0%
	% within DPCMLT	60.0%	37.5%	.0%	40.0%
pain,clicking rt	Count	0	0	2	2
	% within palpation	.0%	.0%	100.0%	100.0%
	% within DPCMLT	.0%	.0%	100.0%	13.3%
pain,clickingrt,lt	Count	0	1	0	1
	% within palpation	.0%	100.0%	.0%	100.0%
	% within DPCMLT	.0%	12.5%	.0%	6.7%
pain,crepitus lt	Count	0	1	0	1
	% within palpation	.0%	100.0%	.0%	100.0%
	% within DPCMLT	.0%	12.5%	.0%	6.7%
pain,crepitus rt	Count	0	1	0	1
	% within palpation	.0%	100.0%	.0%	100.0%
	% within DPCMLT	.0%	12.5%	.0%	6.7%
Total	Count	5	8	2	15
	% within palpation	33.3%	53.3%	13.3%	100.0%
	% within DPCMLT	100.0%	100.0%	100.0%	100.0%

P - 0.122

Table 38: Correlation between auscultation and AERT

Auscultation		AERT				Total
		Sigmoid	Flattened	Box	Deformed	
no sound	Count	3	0	0	1	4
	% within auscultation	75.0%	.0%	.0%	25.0%	100.0%
	% within AERT	25.0%	.0%	.0%	100.0%	26.7%
clicking lt	Count	5	0	1	0	6
	% within auscultation	83.3%	.0%	16.7%	.0%	100.0%
	% within AERT	41.7%	.0%	100.0%	.0%	40.0%
clicking rt	Count	2	0	0	0	2
	% within auscultation	100.0%	.0%	.0%	.0%	100.0%
	% within AERT	16.7%	.0%	.0%	.0%	13.3%
clicking rt,lt	Count	1	0	0	0	1
	% within auscultation	100.0%	.0%	.0%	.0%	100.0%
	% within AERT	8.3%	.0%	.0%	.0%	6.7%
crepitus lt	Count	1	0	0	0	1
	% within auscultation	100.0%	.0%	.0%	.0%	100.0%
	% within AERT	8.3%	.0%	.0%	.0%	6.7%
crepitus rt	Count	0	1	0	0	1
	% within auscultation	.0%	100.0%	.0%	.0%	100.0%
	% within AERT	.0%	100.0%	.0%	.0%	6.7%
Total	Count	12	1	1	1	15
	% within auscultation	80.0%	6.7%	6.7%	6.7%	100.0%
	% within AERT	100.0%	100.0%	100.0%	100.0%	100.0%

P - 0.202

Table 39: Correlation between auscultation and AELT

Auscultation		AELT			Total
		Sigmoid	Flattened	Box	
no sound	Count	2	0	2	4
	% within auscultation	50.0%	.0%	50.0%	100.0%
	% within AELT	22.2%	.0%	66.7%	26.7%
clicking lt	Count	4	2	0	6
	% within auscultation	66.7%	33.3%	.0%	100.0%
	% within AELT	44.4%	66.7%	.0%	40.0%
clicking rt	Count	1	0	1	2
	% within auscultation	50.0%	.0%	50.0%	100.0%
	% within AELT	11.1%	.0%	33.3%	13.3%
clicking rt,lt	Count	1	0	0	1
	% within auscultation	100.0%	.0%	.0%	100.0%
	% within AELT	11.1%	.0%	.0%	6.7%
crepitus lt	Count	0	1	0	1
	% within auscultation	.0%	100.0%	.0%	100.0%
	% within AELT	.0%	33.3%	.0%	6.7%
crepitus rt	Count	1	0	0	1
	% within auscultation	100.0%	.0%	.0%	100.0%
	% within AELT	11.1%	.0%	.0%	6.7%
Total	Count	9	3	3	15
	% within auscultation	60.0%	20.0%	20.0%	100.0%
	% within AELT	100.0%	100.0%	100.0%	100.0%

P - 0 .349

Table 40: Correlation between auscultation and DMRT

Auscultation		DMRT			Total
		Biconcave	Biplanar	Biconvex	
no sound	Count	3	1	0	4
	% within auscultation	75.0%	25.0%	.0%	100.0%
	% within DMRT	30.0%	25.0%	.0%	26.7%
clicking lt	Count	5	0	1	6
	% within auscultation	83.3%	.0%	16.7%	100.0%
	% within DMRT	50.0%	.0%	100.0%	40.0%
clicking rt	Count	1	1	0	2
	% within auscultation	50.0%	50.0%	.0%	100.0%
	% within DMRT	10.0%	25.0%	.0%	13.3%
clicking rt,lt	Count	1	0	0	1
	% within auscultation	100.0%	.0%	.0%	100.0%
	% within DMRT	10.0%	.0%	.0%	6.7%
crepitus lt	Count	0	1	0	1
	% within auscultation	.0%	100.0%	.0%	100.0%
	% within DMRT	.0%	25.0%	.0%	6.7%
crepitus rt	Count	0	1	0	1
	% within auscultation	.0%	100.0%	.0%	100.0%
	% within DMRT	.0%	25.0%	.0%	6.7%
Total	Count	10	4	1	15
	% within auscultation	66.7%	26.7%	6.7%	100.0%
	% within DMRT	100.0%	100.0%	100.0%	100.0%

P -0.468

Table 41: Correlation between auscultation and DMLT

Auscultation		DMLT				Total
		Biconcave	Biplanar	Biconvex	Folded	
no sound	Count	2	1	1	0	4
	% within auscultation	50.0%	25.0%	25.0%	.0%	100.0%
	% within DMLT	20.0%	33.3%	100.0%	.0%	26.7%
clicking lt	Count	3	2	0	1	6
	% within auscultation	50.0%	33.3%	.0%	16.7%	100.0%
	% within DMLT	30.0%	66.7%	.0%	100.0%	40.0%
clicking rt	Count	2	0	0	0	2
	% within auscultation	100.0%	.0%	.0%	.0%	100.0%
	% within DMLT	20.0%	.0%	.0%	.0%	13.3%
clicking rt,lt	Count	1	0	0	0	1
	% within auscultation	100.0%	.0%	.0%	.0%	100.0%
	% within DMLT	10.0%	.0%	.0%	.0%	6.7%
crepitus lt	Count	1	0	0	0	1
	% within auscultation	100.0%	.0%	.0%	.0%	100.0%
	% within DMLT	10.0%	.0%	.0%	.0%	6.7%
crepitus rt	Count	1	0	0	0	1
	% within auscultation	100.0%	.0%	.0%	.0%	100.0%
	% within DMLT	10.0%	.0%	.0%	.0%	6.7%
Total	Count	10	3	1	1	15
	% within auscultation	66.7%	20.0%	6.7%	6.7%	100.0%
	% within DMLT	100.0%	100.0%	100.0%	100.0%	100.0%

P - 0.955

Table 42: Correlation between auscultation and DPOMRT

Auscultation		DPOMRT		Total
		Anterior	Posterior	
no sound	Count	2	2	4
	% within auscultation	50.0%	50.0%	100.0%
	% within DPOMRT	100.0%	15.4%	26.7%
clicking lt	Count	0	6	6
	% within auscultation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	46.2%	40.0%
clicking rt	Count	0	2	2
	% within auscultation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	15.4%	13.3%
clicking rt,lt	Count	0	1	1
	% within auscultation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	7.7%	6.7%
crepitus lt	Count	0	1	1
	% within auscultation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	7.7%	6.7%
crepitus rt	Count	0	1	1
	% within auscultation	.0%	100.0%	100.0%
	% within DPOMRT	.0%	7.7%	6.7%
Total	Count	2	13	15
	% within auscultation	13.3%	86.7%	100.0%
	% within DPOMRT	100.0%	100.0%	100.0%

P - .274

Table 43: Correlation between auscultation and DPOMLT

Auscultation		DPOMLT		Total
		Anterior	Posterior	
no sound	Count	1	3	4
	% within auscultation	25.0%	75.0%	100.0%
	% within DPOMLT	50.0%	23.1%	26.7%
clicking lt	Count	1	5	6
	% within auscultation	16.7%	83.3%	100.0%
	% within DPOMLT	50.0%	38.5%	40.0%
clicking rt	Count	0	2	2
	% within auscultation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	15.4%	13.3%
clicking rt,lt	Count	0	1	1
	% within auscultation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	7.7%	6.7%
crepitus lt	Count	0	1	1
	% within auscultation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	7.7%	6.7%
crepitus rt	Count	0	1	1
	% within auscultation	.0%	100.0%	100.0%
	% within DPOMLT	.0%	7.7%	6.7%
Total	Count	2	13	15
	% within auscultation	13.3%	86.7%	100.0%
	% within DPOMLT	100.0%	100.0%	100.0%

P - 0.935

Table 44: Correlation between auscultation and DPCMRT

Auscultation		**DPCMRT**				**Total**
		Anterior	**Antero superior**	**Superior**	**Antero inferior**	
no sound	Count	1	2	1	0	4
	% within auscultation	25.0%	50.0%	25.0%	.0%	100.0%
	% within DPCMRT	50.0%	25.0%	25.0%	.0%	26.7%
clicking lt	Count	0	3	2	1	6
	% within auscultation	.0%	50.0%	33.3%	16.7%	100.0%
	% within DPCMRT	.0%	37.5%	50.0%	100.0%	40.0%
clicking rt	Count	0	2	0	0	2
	% within auscultation	.0%	100.0%	.0%	.0%	100.0%
	% within DPCMRT	.0%	25.0%	.0%	.0%	13.3%
clicking rt,lt	Count	0	1	0	0	1
	% within auscultation	.0%	100.0%	.0%	.0%	100.0%
	% within DPCMRT	.0%	12.5%	.0%	.0%	6.7%
crepitus lt	Count	0	0	1	0	1
	% within auscultation	.0%	.0%	100.0%	.0%	100.0%
	% within DPCMRT	.0%	.0%	25.0%	.0%	6.7%
crepitus rt	Count	1	0	0	0	1
	% within auscultation	100.0%	.0%	.0%	.0%	100.0%
	% within DPCMRT	50.0%	.0%	.0%	.0%	6.7%
Total	Count	2	8	4	1	15
	% within auscultation	13.3%	53.3%	26.7%	6.7%	100.0%
	% within DPCMRT	100.0%	100.0%	100.0%	100.0%	100.0%

P - 0.497

Table 45: Correlation between auscultation and DPCMLT

Auscultation		DPCMLT			Total
		Anterior	Antero superior	Superior	
no sound	Count	2	2	0	4
	% within auscultation	50.0%	50.0%	.0%	100.0%
	% within DPCMLT	40.0%	25.0%	.0%	26.7%
clicking lt	Count	3	3	0	6
	% within auscultation	50.0%	50.0%	.0%	100.0%
	% within DPCMLT	60.0%	37.5%	.0%	40.0%
clicking rt	Count	0	0	2	2
	% within auscultation	.0%	.0%	100.0%	100.0%
	% within DPCMLT	.0%	.0%	100.0%	13.3%
clicking rt,lt	Count	0	1	0	1
	% within auscultation	.0%	100.0%	.0%	100.0%
	% within DPCMLT	.0%	12.5%	.0%	6.7%
crepitus lt	Count	0	1	0	1
	% within auscultation	.0%	100.0%	.0%	100.0%
	% within DPCMLT	.0%	12.5%	.0%	6.7%
crepitus rt	Count	0	1	0	1
	% within auscultation	.0%	100.0%	.0%	100.0%
	% within DPCMLT	.0%	12.5%	.0%	6.7%
Total	Count	5	8	2	15
	% within auscultation	33.3%	53.3%	13.3%	100.0%
	% within DPCMLT	100.0%	100.0%	100.0%	100.0%

P - .058

Table 46: Correlation between DMRT and DPOMRT

DM-RT		DP-OMRT		Total
		Anterior	Posterior	
Biconcave	Count	1	9	10
	% within DM-RT	10.0%	90.0%	100.0%
	% within DP-OMRT	50.0%	69.2%	66.7%
Biplanar	Count	1	3	4
	% within DM-RT	25.0%	75.0%	100.0%
	% within DP-OMRT	50.0%	23.1%	26.7%
Biconvex	Count	0	1	1
	% within DM-RT	.0%	100.0%	100.0%
	% within DP-OMRT	.0%	7.7%	6.7%
Total	Count	2	13	15
	% within DM-RT	13.3%	86.7%	100.0%
	% within DP-OMRT	100.0%	100.0%	100.0%

P – 0.69

Table 47: Correlation between DMRT and DPCMRT

DM-RT		**DP-CMRT**				**Total**
		Anterior	**Antero superior**	**Superior**	**Antero inferior**	
Biconcave	Count	1	6	3	0	10
	% within DM-RT	10.0%	60.0%	30.0%	.0%	100.0%
	% within DP-CMRT	50.0%	75.0%	75.0%	.0%	66.7%
Biplanar	Count	1	2	1	0	4
	% within DM-RT	25.0%	50.0%	25.0%	.0%	100.0%
	% within DP-CMRT	50.0%	25.0%	25.0%	.0%	26.7%
Biconvex	Count	0	0	0	1	1
	% within DM-RT	.0%	.0%	.0%	100.0%	100.0%
	% within DP-CMRT	.0%	.0%	.0%	100.0%	6.7%
Total	Count	2	8	4	1	15
	% within DM-RT	13.3%	53.3%	26.7%	6.7%	100.0%
	% within DP-CMRT	100.0%	100.0%	100.0%	100.0%	100.0%

P – 0.016

Table 48: Correlation between DMLT and DPOMLT

DM-LT		DP-OMLT		Total
		Anterior	Posterior	
Biconcave	Count	0	10	10
	% within DM-LT	.0%	100.0%	100.0%
	% within DP-OMLT	.0%	76.9%	66.7%
Biplanar	Count	0	3	3
	% within DM-LT	.0%	100.0%	100.0%
	% within DP-OMLT	.0%	23.1%	20.0%
Biconvex	Count	1	0	1
	% within DM-LT	100.0%	.0%	100.0%
	% within DP-OMLT	50.0%	.0%	6.7%
Folded	Count	1	0	1
	% within DM-LT	100.0%	.0%	100.0%
	% within DP-OMLT	50.0%	.0%	6.7%
Total	Count	2	13	15
	% within DM-LT	13.3%	86.7%	100.0%
	% within DP-OMLT	100.0%	100.0%	100.0%

P- 0.002

Table 49: Correlation between DMLT and DPCMLT

DM-LT		DP-CMLT			Total
		Anterior	Antero superior	Superior	
Biconcave	Count	2	6	2	10
	% within DM-LT	20.0%	60.0%	20.0%	100.0%
	% within DP-CMLT	40.0%	75.0%	100.0%	66.7%
Biplanar	Count	2	1	0	3
	% within DM-LT	66.7%	33.3%	.0%	100.0%
	% within DP-CMLT	40.0%	12.5%	.0%	20.0%
Biconvex	Count	1	0	0	1
	% within DM-LT	100.0%	.0%	.0%	100.0%
	% within DP-CMLT	20.0%	.0%	.0%	6.7%
Folded	Count	0	1	0	1
	% within DM-LT	.0%	100.0%	.0%	100.0%
	% within DP-CMLT	.0%	12.5%	.0%	6.7%
Total	Count	5	8	2	15
	% within DM-LT	33.3%	53.3%	13.3%	100.0%
	% within DP-CMLT	100.0%	100.0%	100.0%	100.0%

P – 0.48

Table 50: Correlation between DPOMRT and DPCMRT

DP-OMRT		DP-CMRT				Total
		Anterior	Antero superior	Superior	Antero inferior	
Anterior	Count	1	1	0	0	2
	% within DP-OMRT	50.0%	50.0%	.0%	.0%	100.0%
	% within DP-CMRT	50.0%	12.5%	.0%	.0%	13.3%
Posterior	Count	1	7	4	1	13
	% within DP-OMRT	7.7%	53.8%	30.8%	7.7%	100.0%
	% within DP-CMRT	50.0%	87.5%	100.0%	100.0%	86.7%
Total	Count	2	8	4	1	15
	% within DP-OMRT	13.3%	53.3%	26.7%	6.7%	100.0%
	% within DP-CMRT	100.0%	100.0%	100.0%	100.0%	100.0%

P – 0.376

Table 51: Correlation between DPOMLT and DPCMLT

DP-OMLT		DP-CMLT			Total
		Anterior	Antero superior	Superior	
Anterior	Count	1	1	0	2
	% within DP-OMLT	50.0%	50.0%	.0%	100.0%
	% within DP-CMLT	20.0%	12.5%	.0%	13.3%
Posterior	Count	4	7	2	13
	% within DP-OMLT	30.8%	53.8%	15.4%	100.0%
	% within DP-CMLT	80.0%	87.5%	100.0%	86.7%
Total	Count	5	8	2	15
	% within DP-OMLT	33.3%	53.3%	13.3%	100.0%
	% within DP-CMLT	100.0%	100.0%	100.0%	100.0%

P – 0.777

Table 52: Correlation between DPOMRT and DPOMLT

DPOMRT		DPOMLT		Total
		Anterior	Posterior	
anterior	Count	1	1	2
	% within DPOMRT	50.0%	50.0%	100.0%
	% within DPOMLT	50.0%	7.7%	13.3%
posterior	Count	1	12	13
	% within DPOMRT	7.7%	92.3%	100.0%
	% within DPOMLT	50.0%	92.3%	86.7%
Total	Count	2	13	15
	% within DPOMRT	13.3%	86.7%	100.0%
	% within DPOMLT	100.0%	100.0%	100.0%

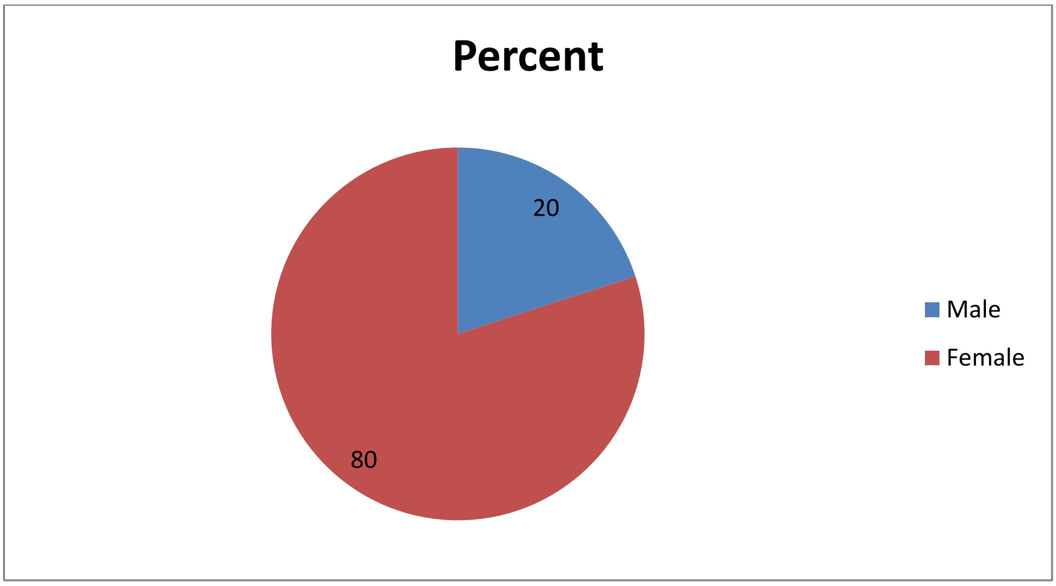
P -0.101

Table 53: Correlation between DPCMRT and DPCMLT

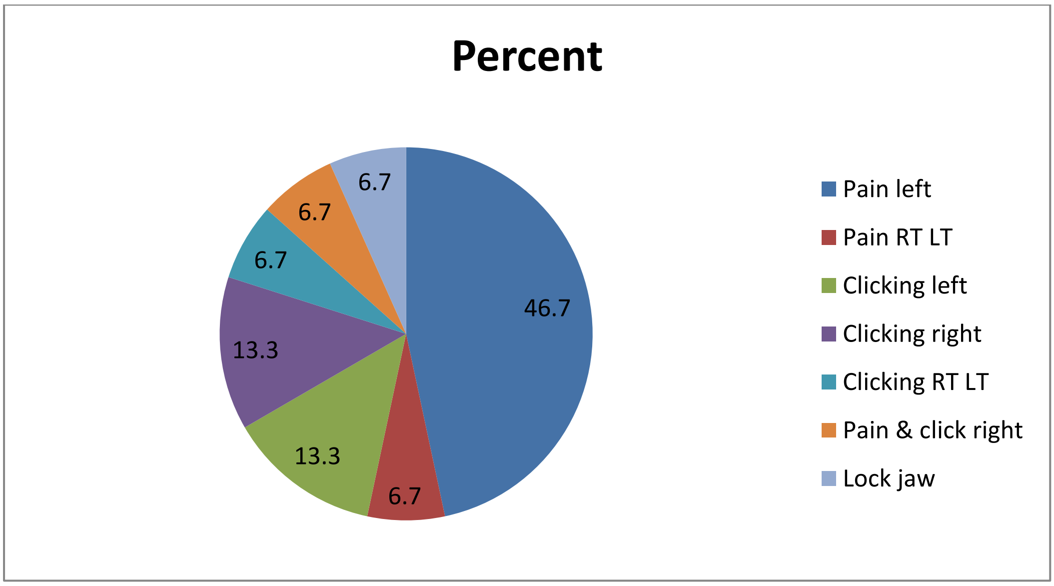
DPCMRT		**DPCMLT**			**Total**
		Anterior	**Antero superior**	**Superior**	
anterior	Count	1	1	0	2
	% within DPCMRT	50.0%	50.0%	.0%	100.0%
	% within DPCMLT	20.0%	12.5%	.0%	13.3%
Antero superior	Count	3	3	2	8
	% within DPCMRT	37.5%	37.5%	25.0%	100.0%
	% within DPCMLT	60.0%	37.5%	100.0%	53.3%
superior	Count	0	4	0	4
	% within DPCMRT	.0%	100.0%	.0%	100.0%
	% within DPCMLT	.0%	50.0%	.0%	26.7%
Antero inferior	Count	1	0	0	1
	% within DPCMRT	100.0%	.0%	.0%	100.0%
	% within DPCMLT	20.0%	.0%	.0%	6.7%
Total	Count	5	8	2	15
	% within DPCMRT	33.3%	53.3%	13.3%	100.0%
	% within DPCMLT	100.0%	100.0%	100.0%	100.0%

P -0.305

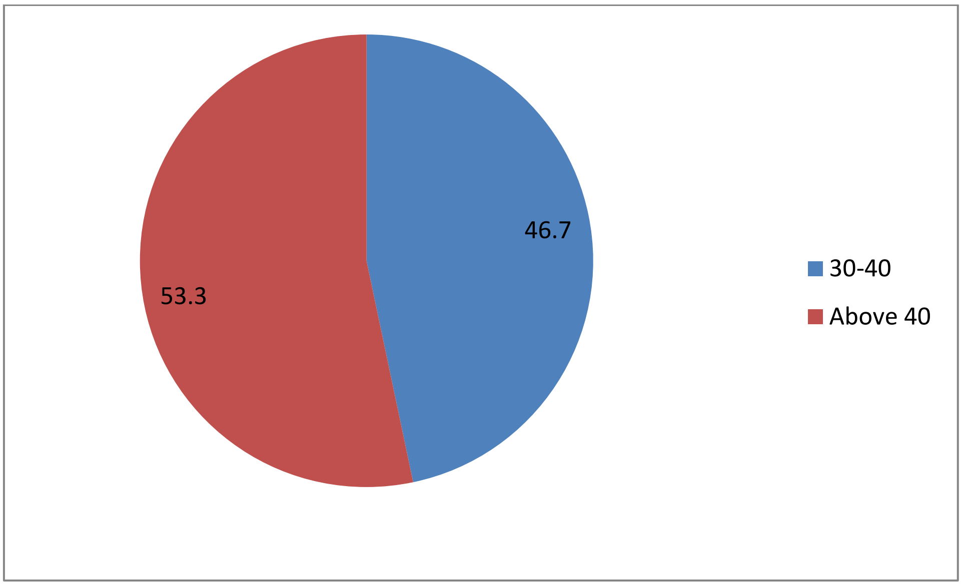
Graph-1: Distribution of subjects according to sex



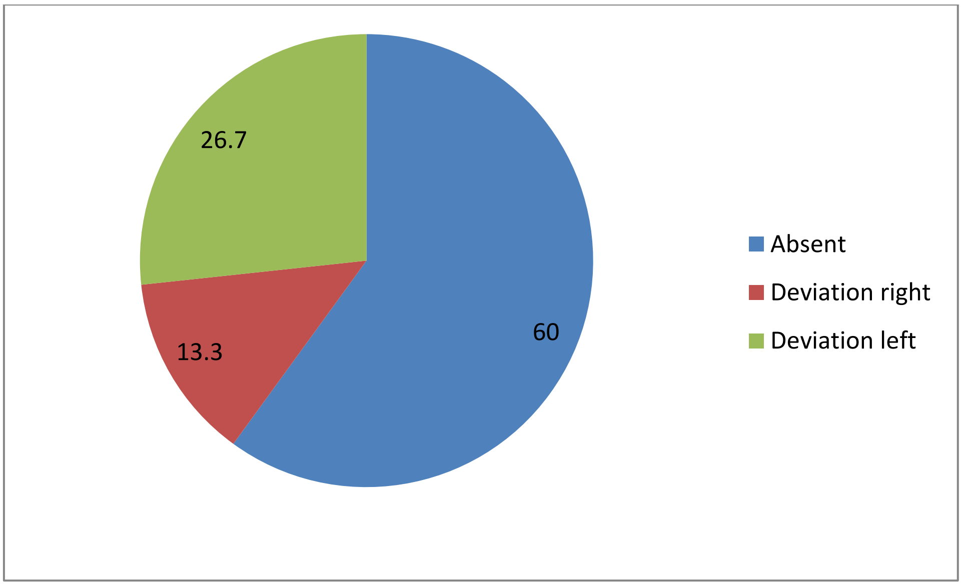
Graph-2: Distribution of subjects according to chief complaint



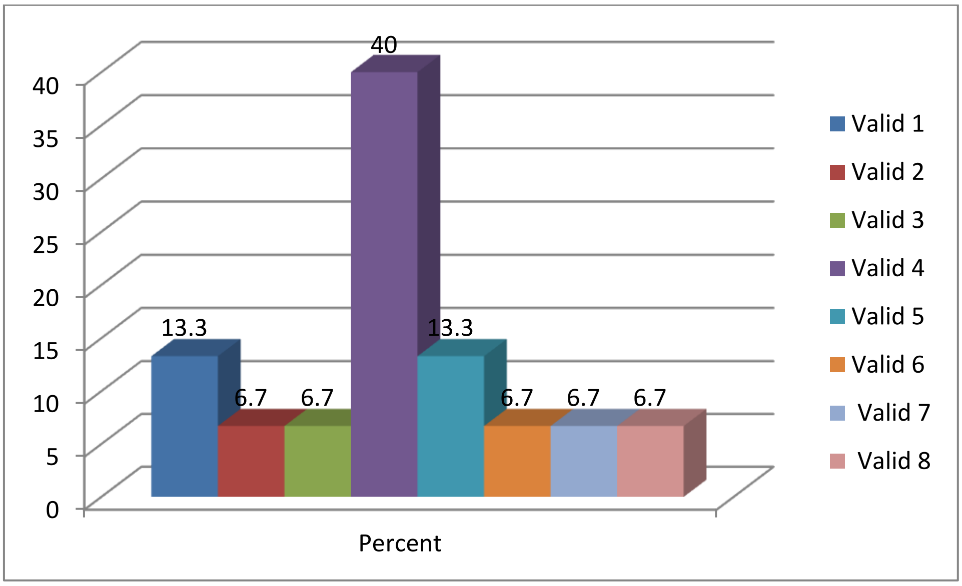
Graph-3: Distribution of subjects according to mouth opening



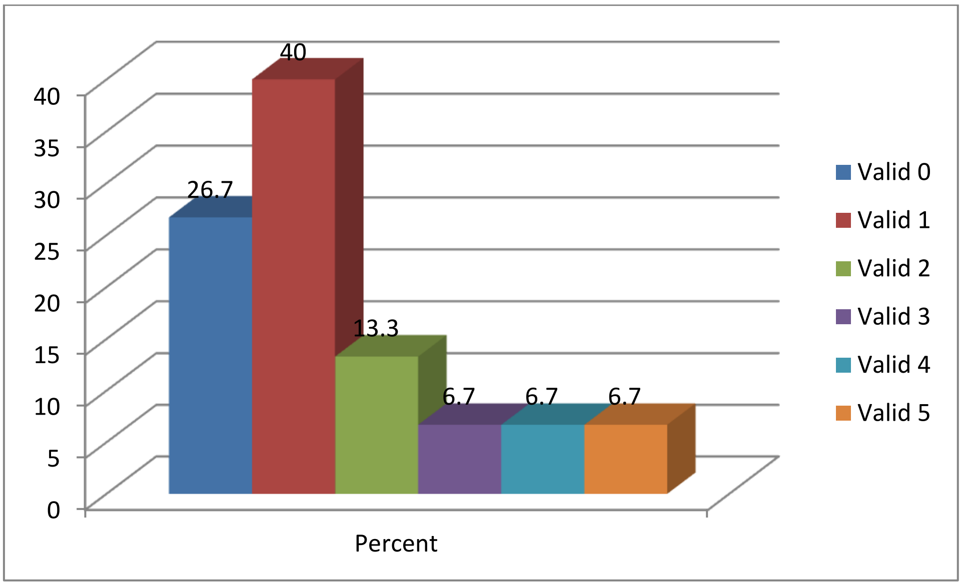
Graph-4: Distribution of subjects according to deviation



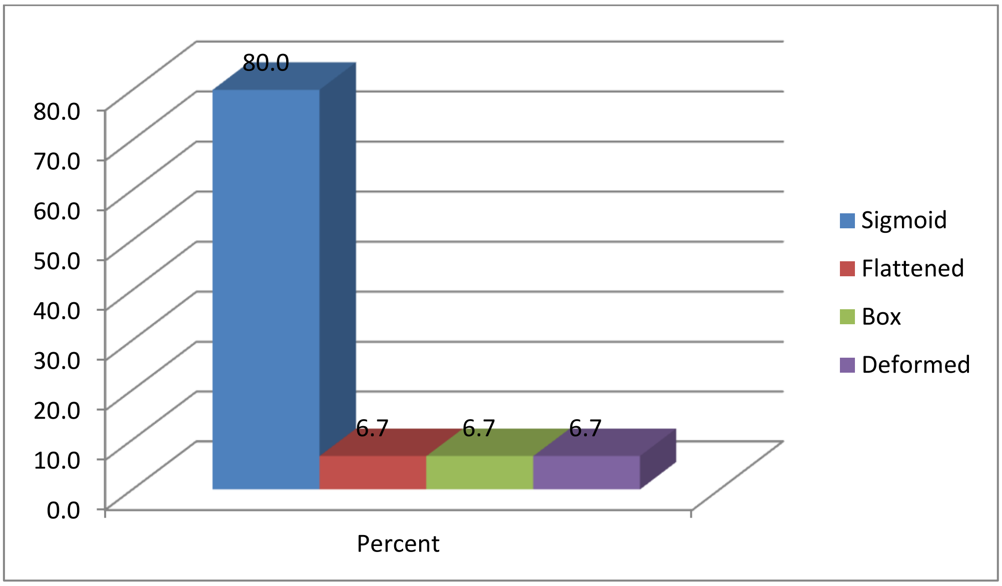
Graph-5: Distribution of subjects according to palpatory findings



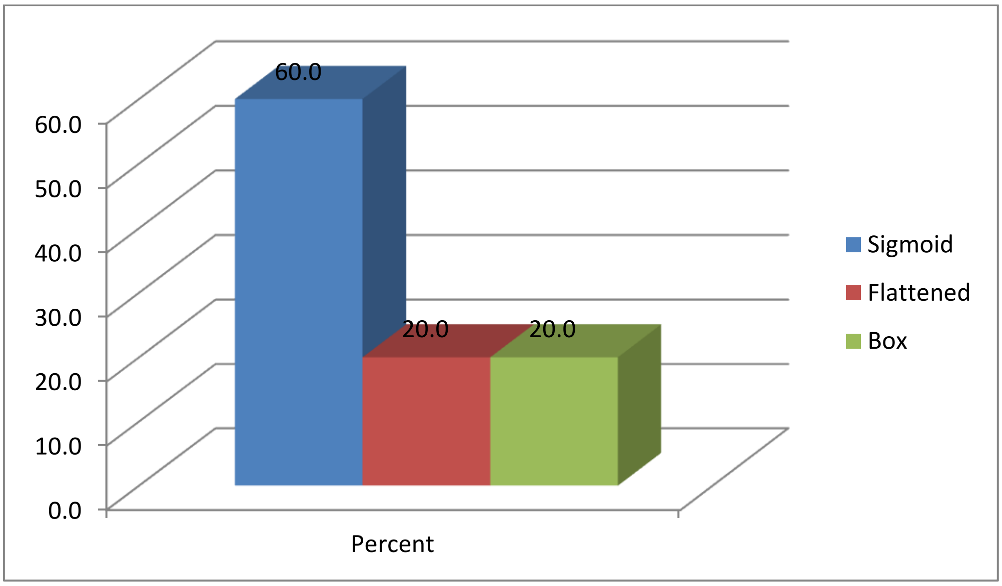
Graph-6: Distribution of subjects according to auscultarory findings



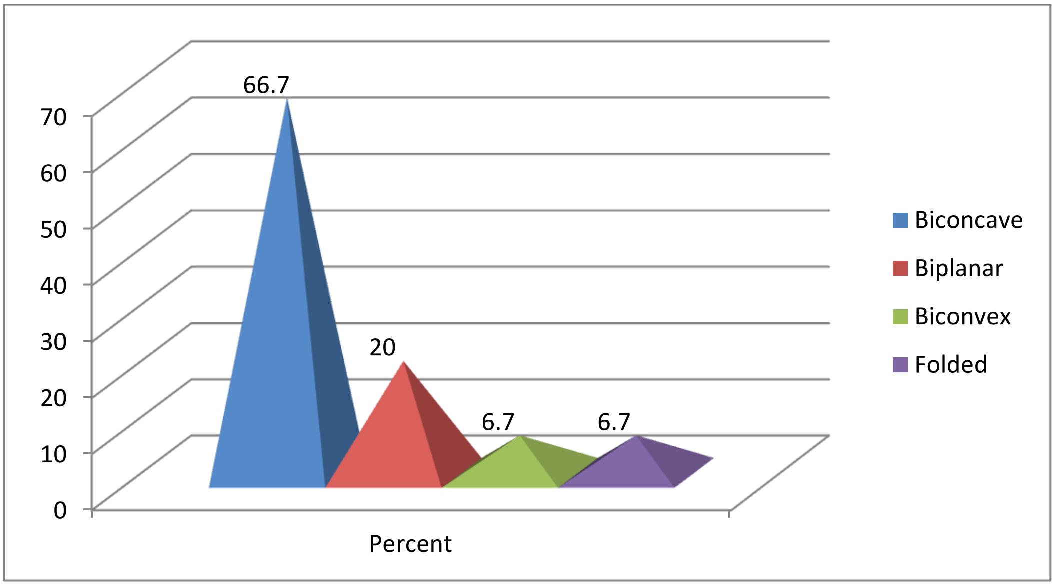
Graph-7: Distribution of articular eminence morphology in right TMJ



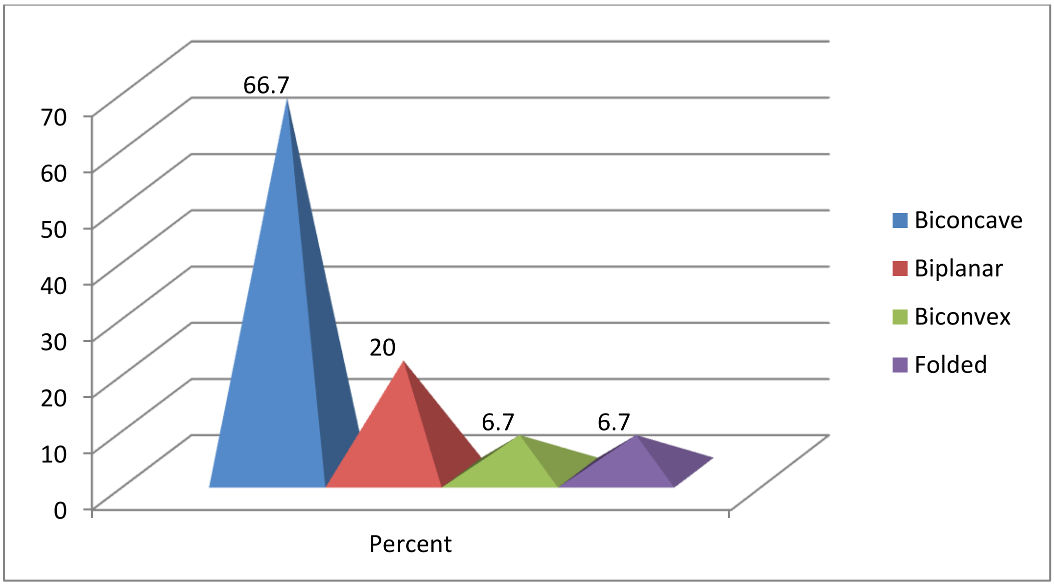
Graph-8: Distribution of articular eminence morphology in left TMJ



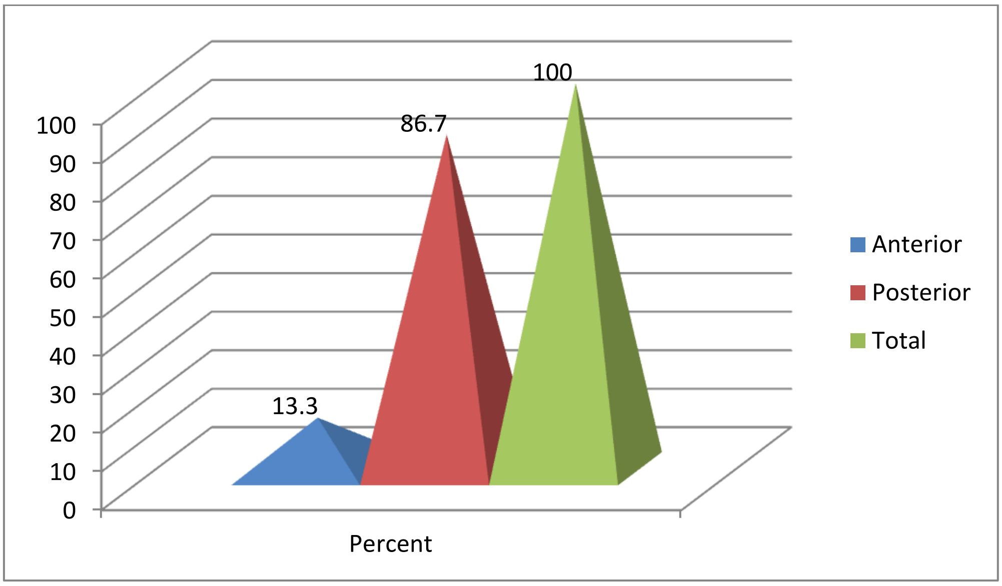
Graph-9: Distribution of disc morphology in right TMJ



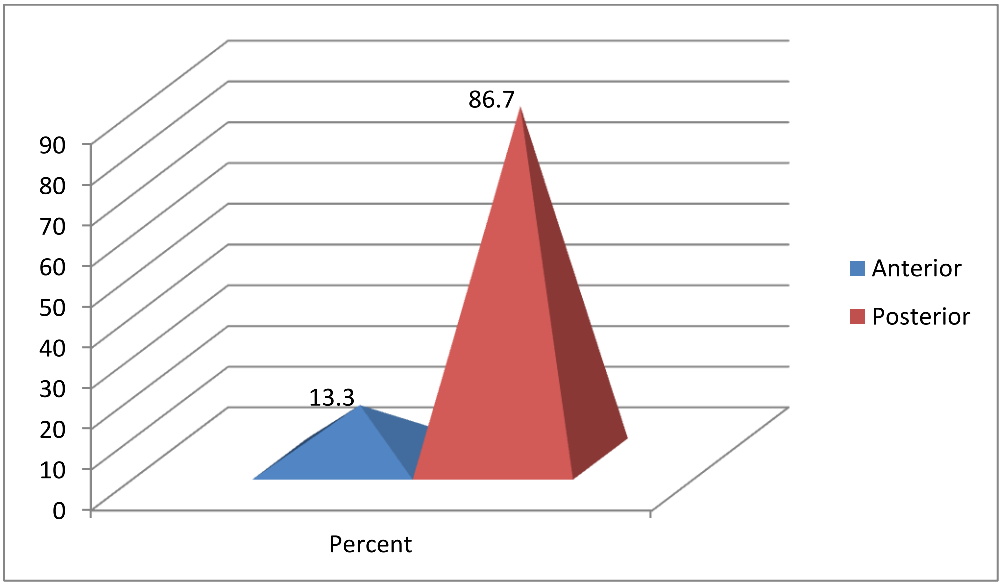
Graph-10: Distribution of disc morphology in left TMJ



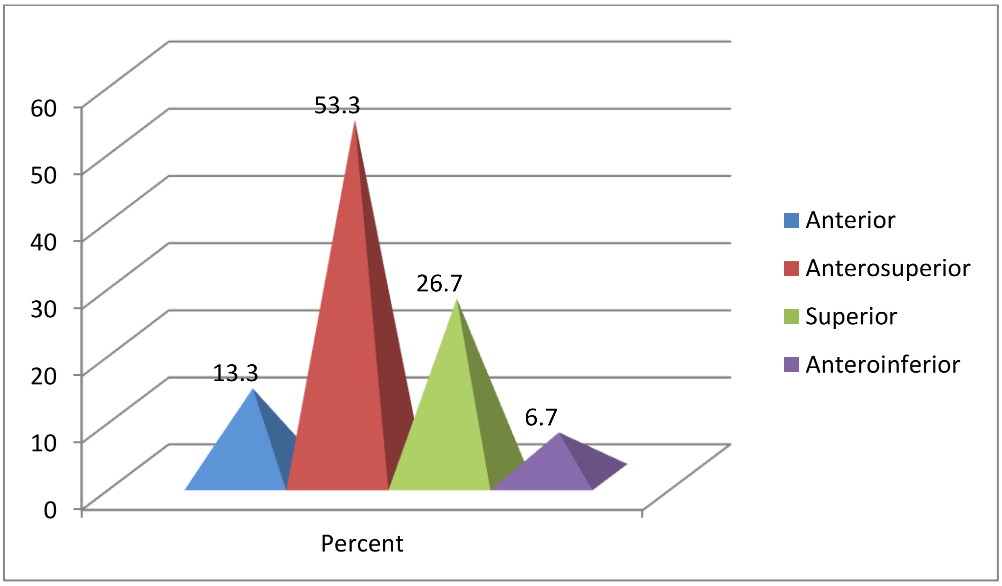
Graph-11: Distribution of disc position in open mouth in right TMJ



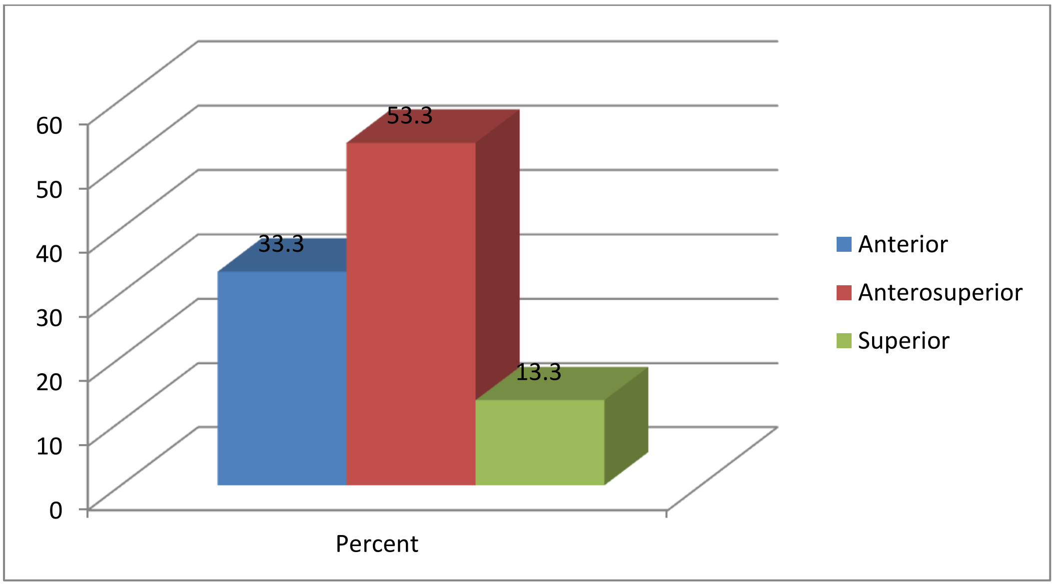
Graph-12: Distribution of disc position in open mouth in left TMJ



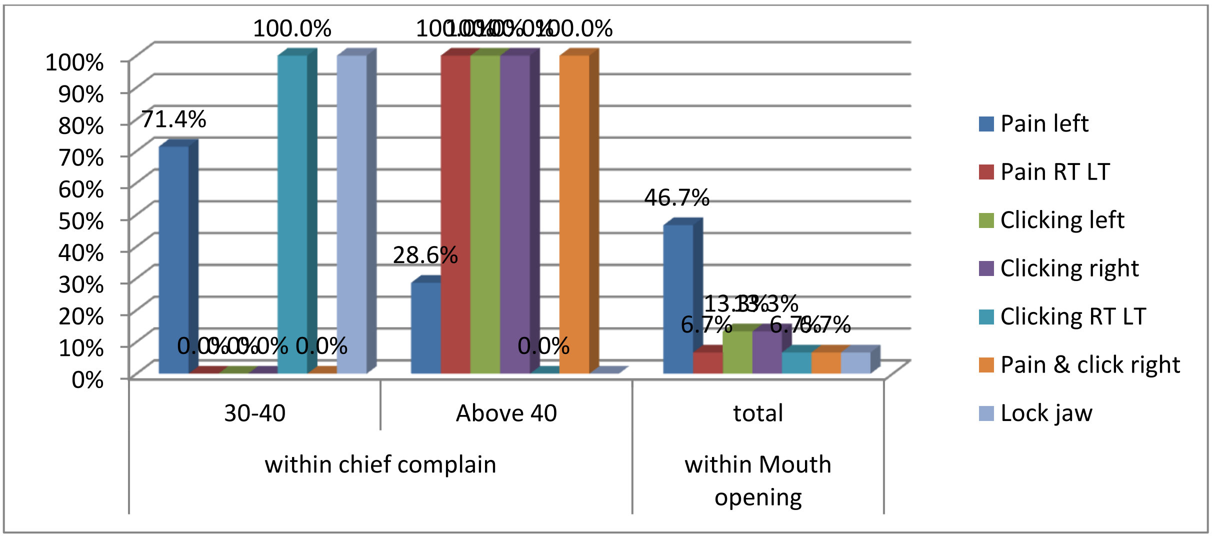
Graph-13: Distribution of disc position in close mouth in right TMJ



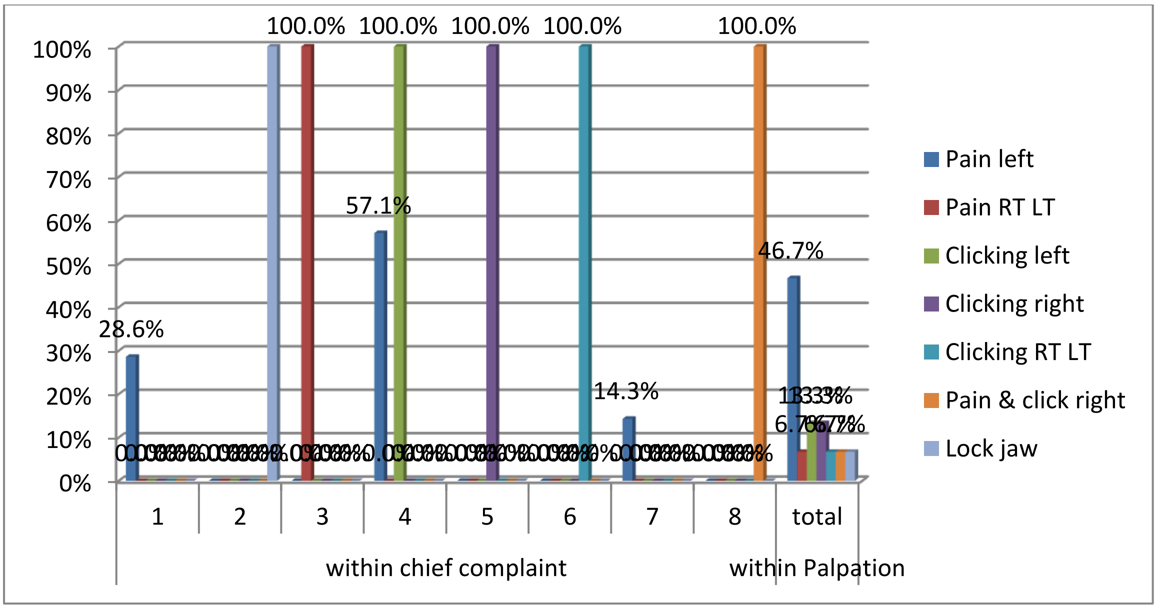
Graph-14: Distribution of disc position in close mouth in left TMJ



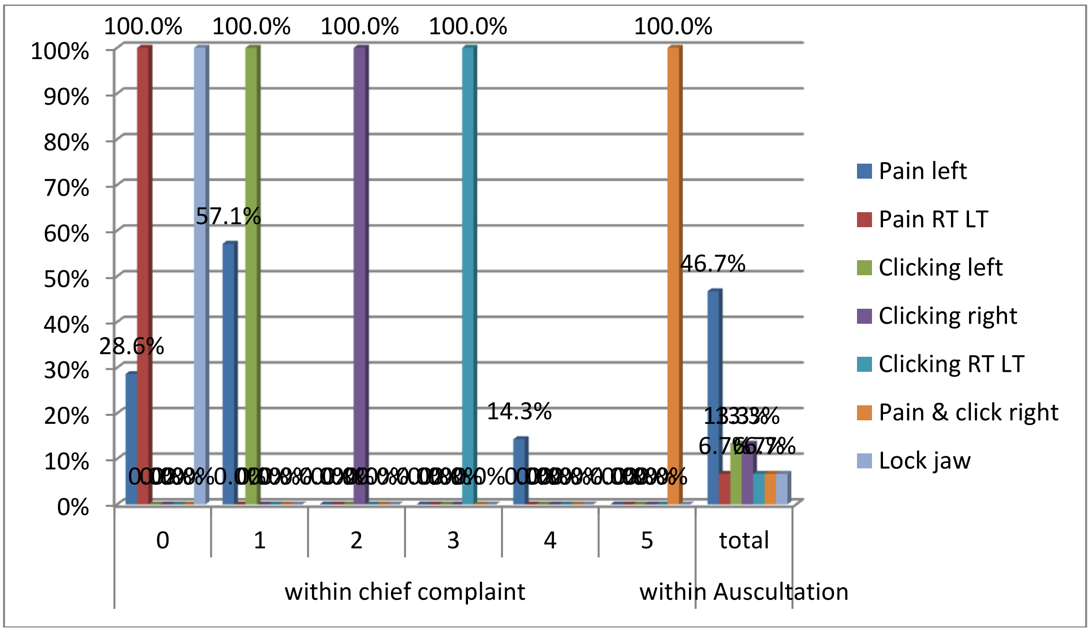
Graph-15: Correlation between chief complaint and mouth opening



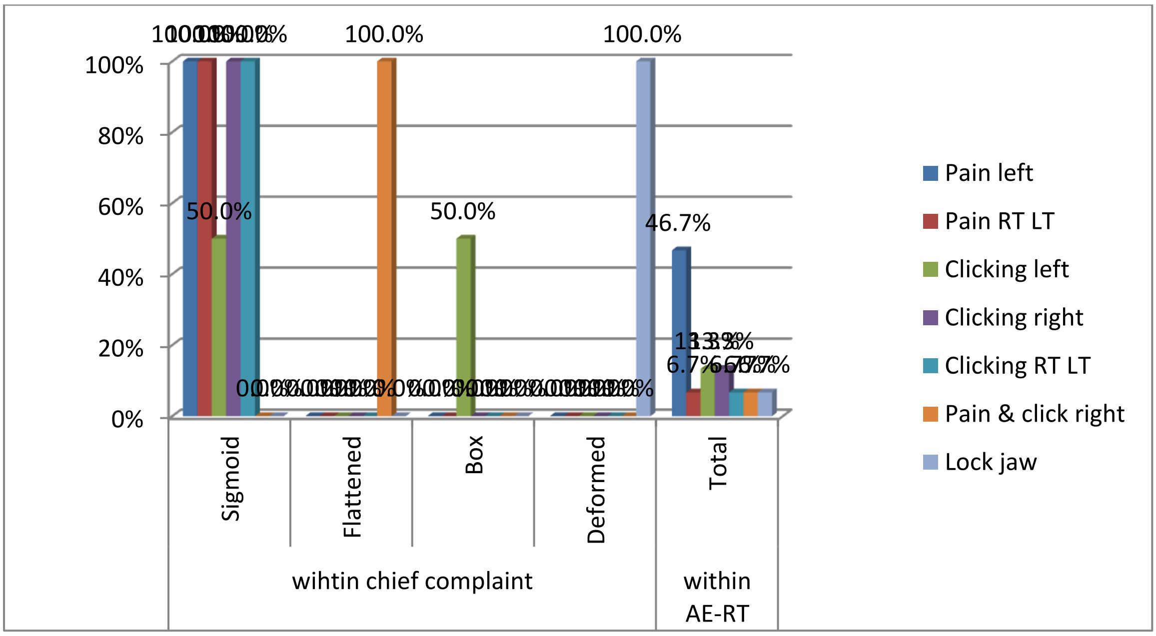
Graph-16: Correlation between chief complaint and palpatory findings



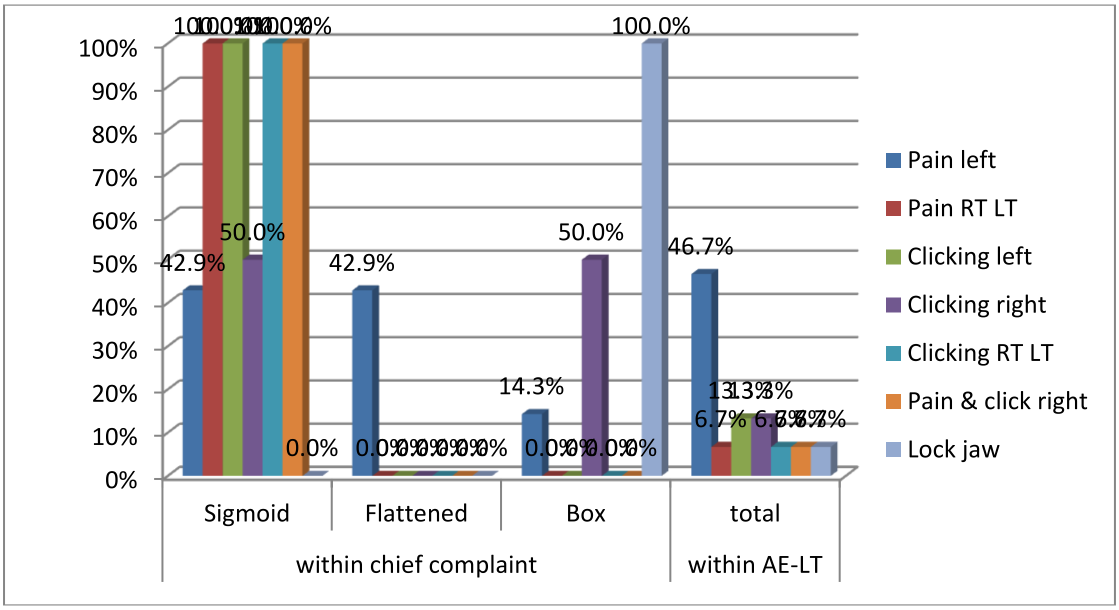
Graph-17: Correlation between chief complaint and auscultatory findings



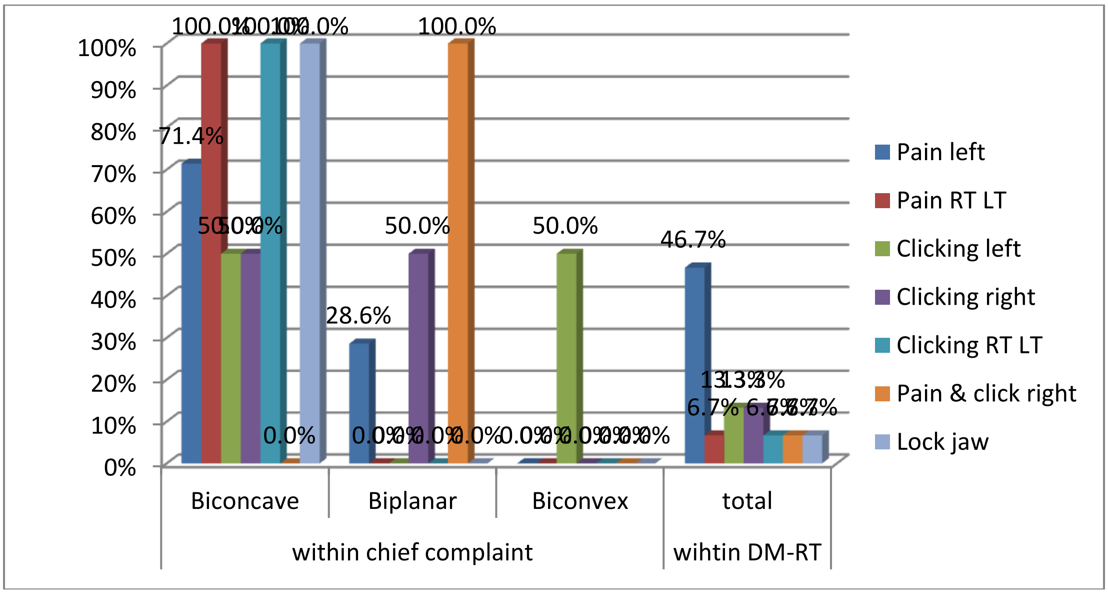
Graph-18: Correlation between chief complaint and AERT



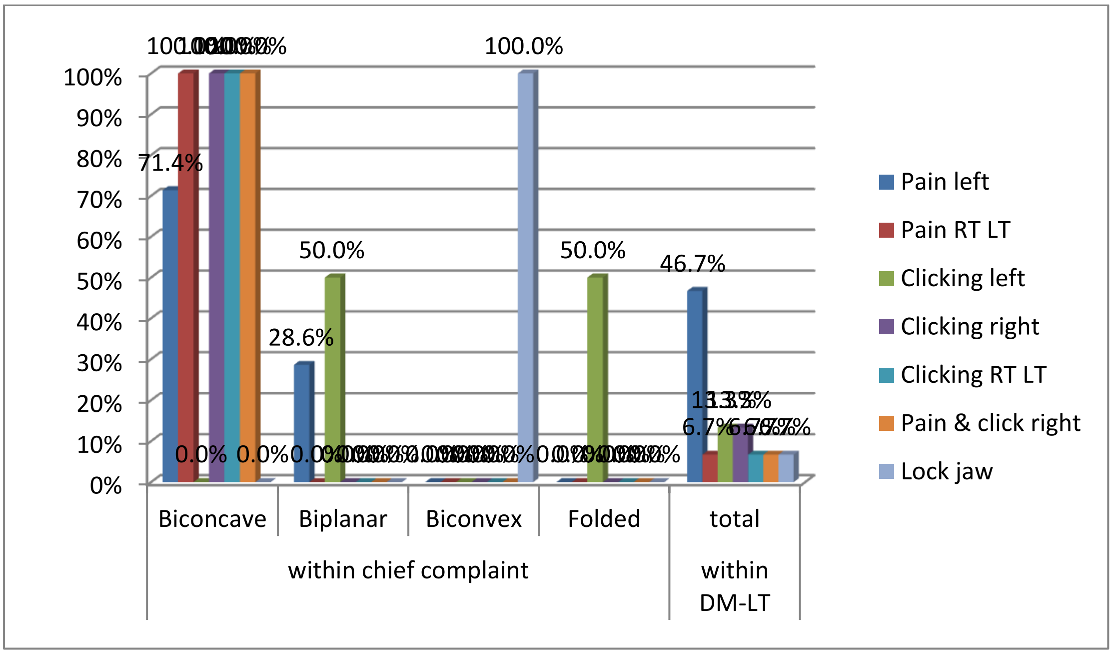
Graph-19: Correlation between chief complaint and AELT



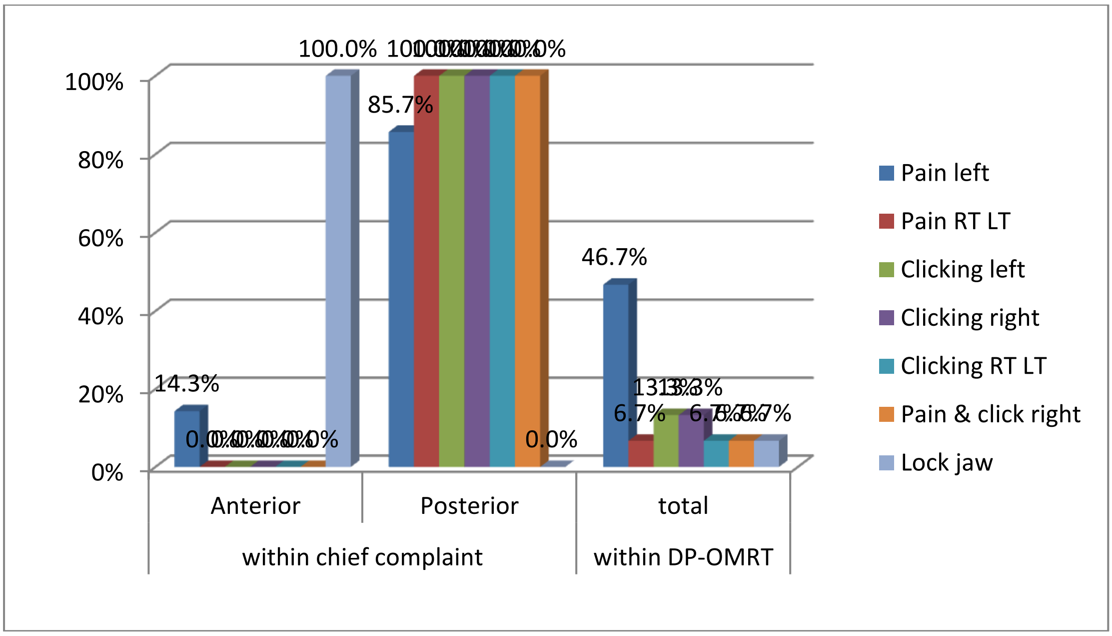
Graph-20: Correlation between chief complaint and DMRT



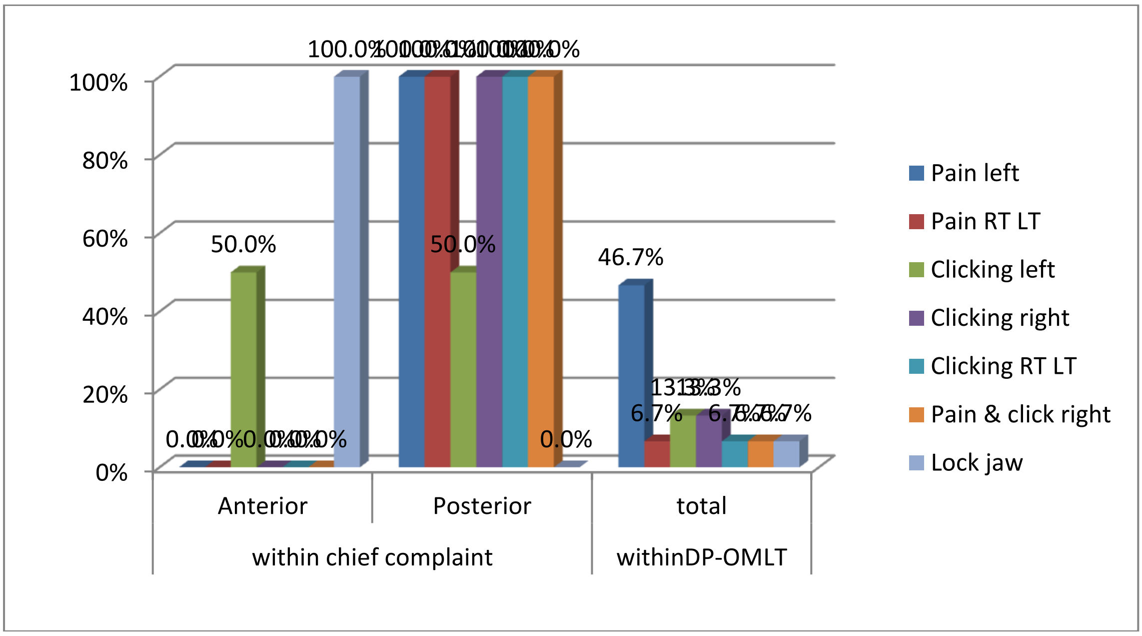
Graph-21: Correlation between chief complaint and DMLT



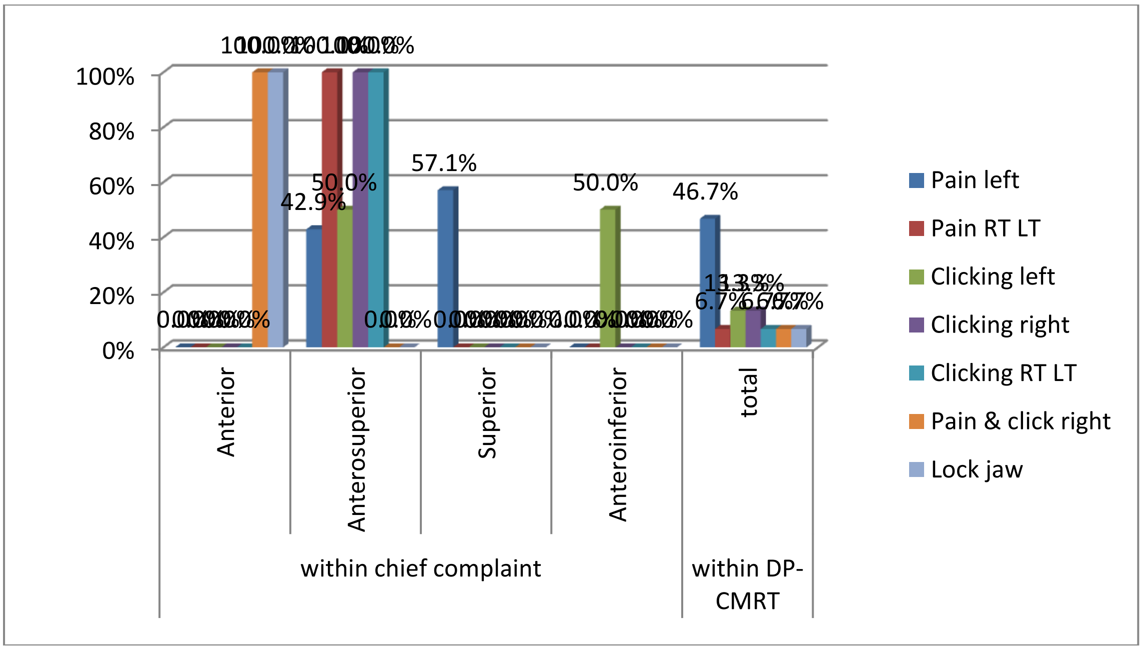
Graph-22: Correlation between chief complaint and DPOMRT



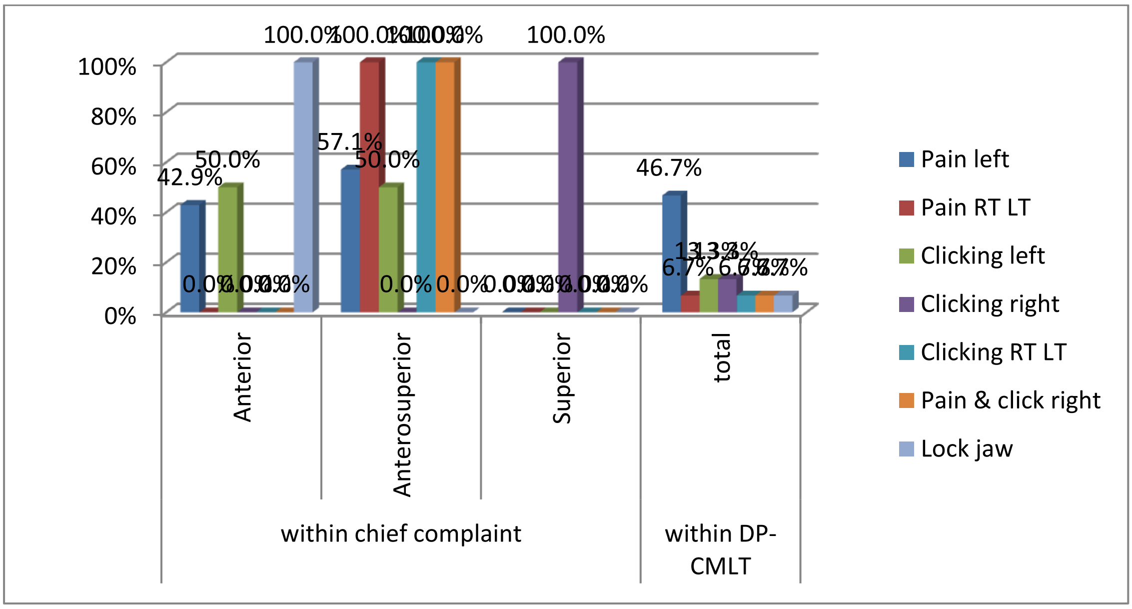
Graph-23: Correlation between chief complaint and DPOMLT



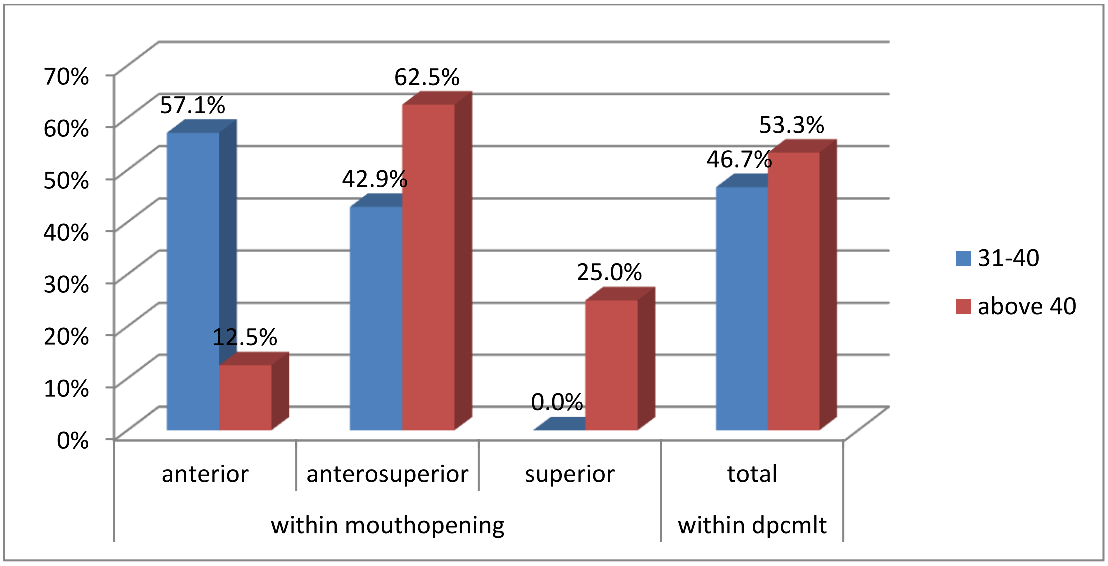
Graph-24: Correlation between chief complaint and DPCMRT



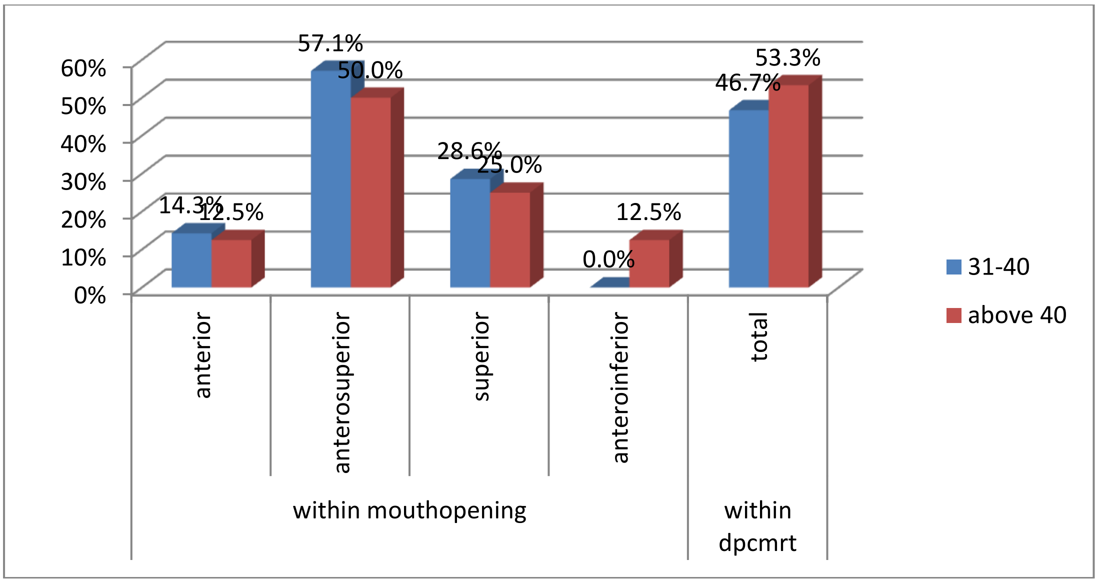
Graph-25: Correlation between chief complaint and DPCMLT



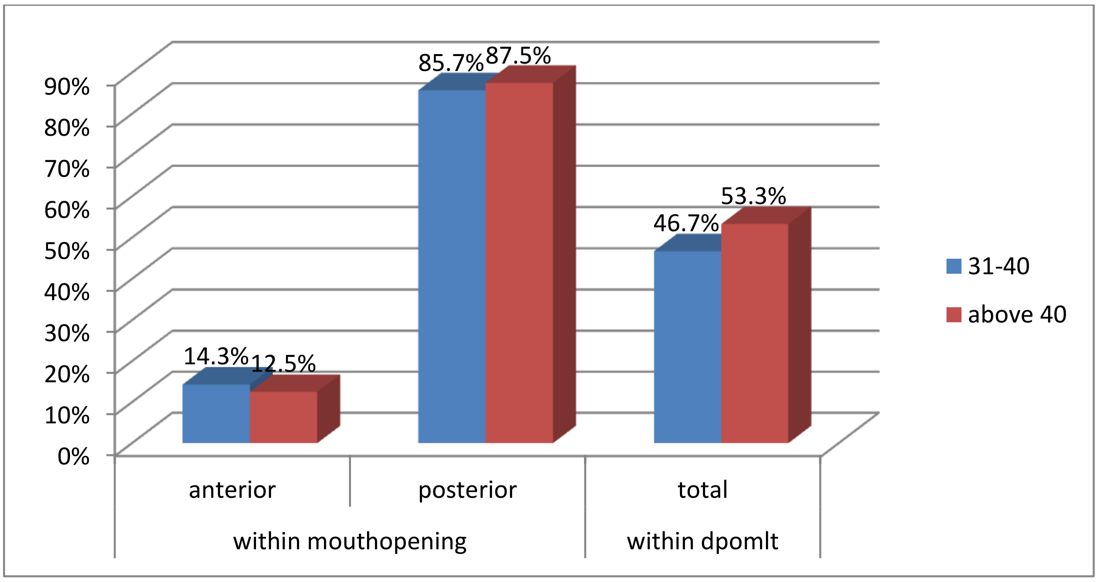
Graph-26: Correlation between mouth opening and DPCMLT



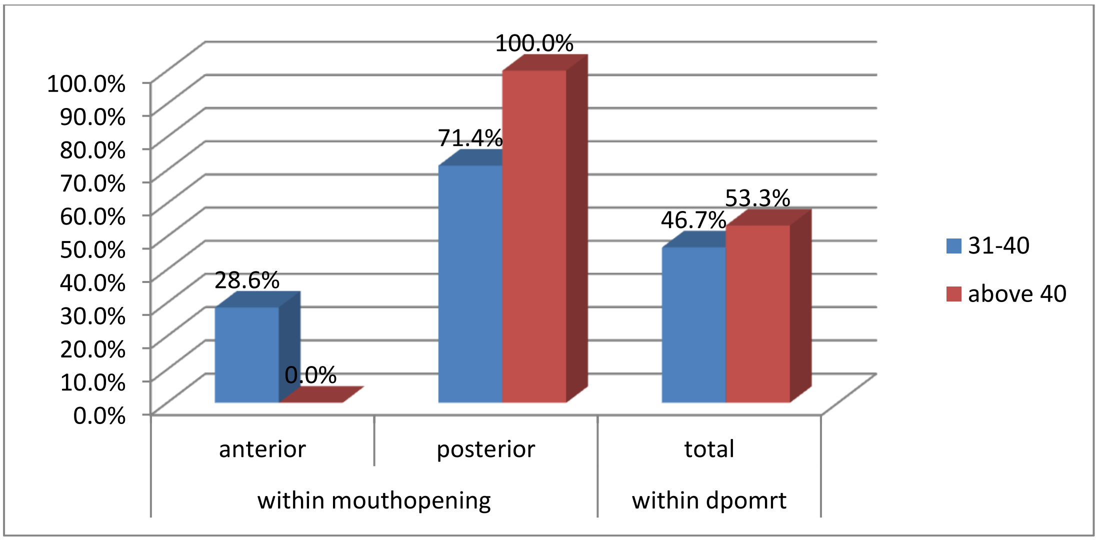
Graph-27: Correlation between mouth opening and DPCMRT



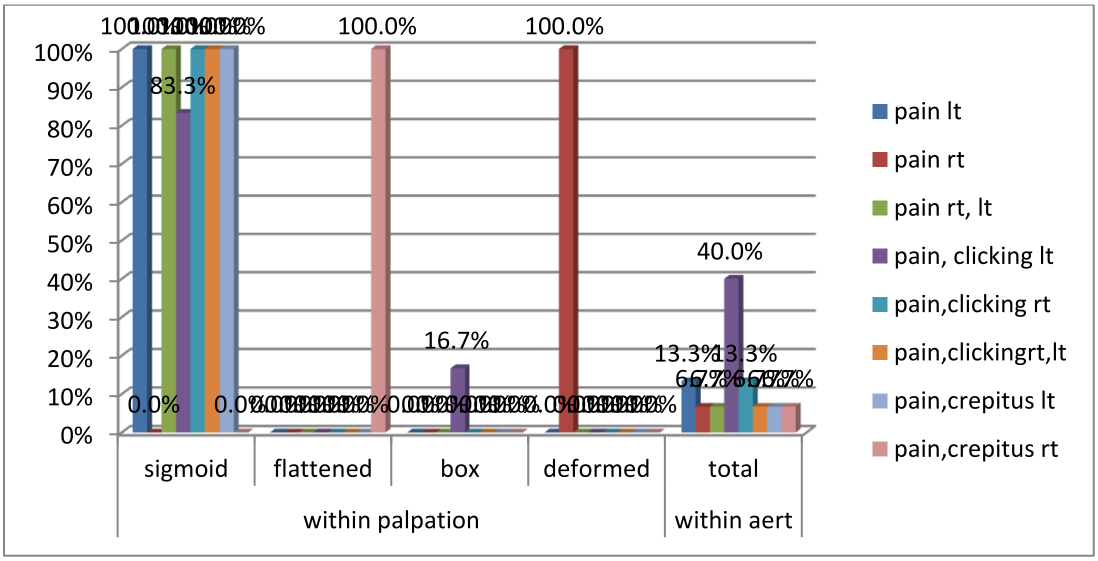
Graph-28: Correlation between mouth opening and DPOMLT



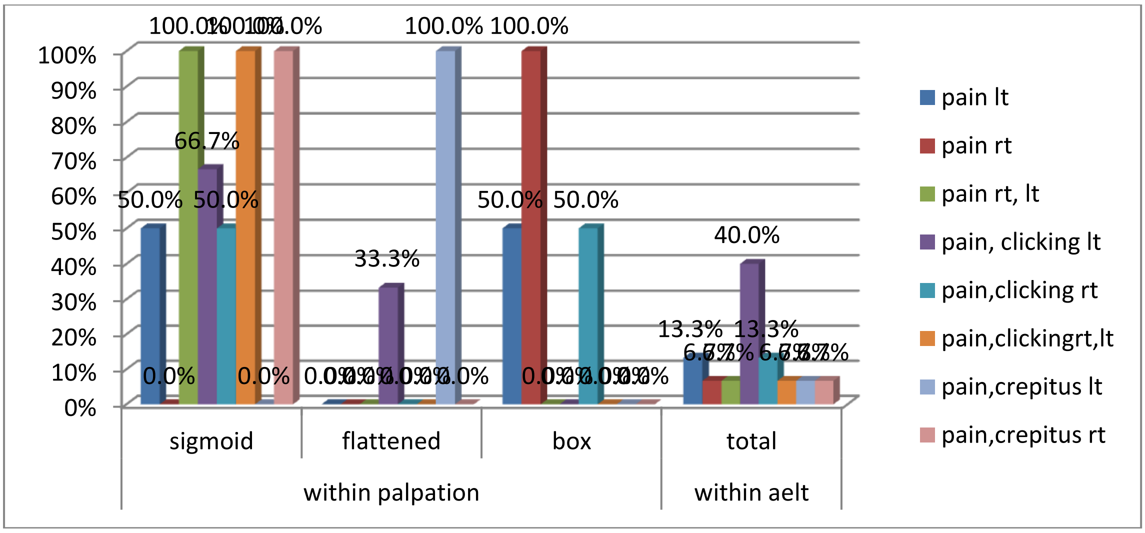
Graph-29: Correlation between mouth opening and DPOMRT



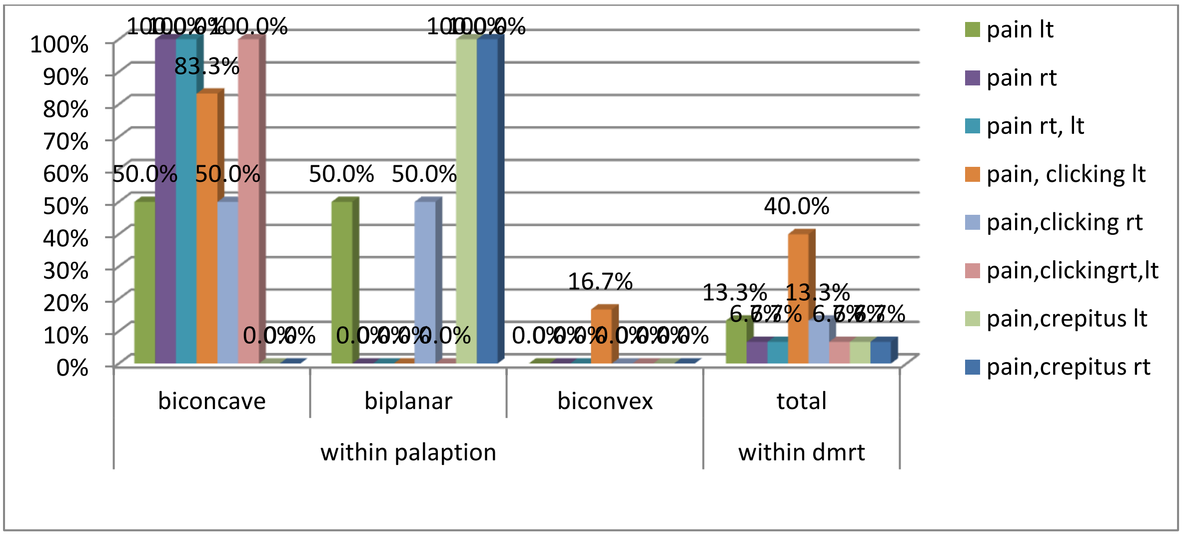
Graph-30: Correlation between palpation and AERT



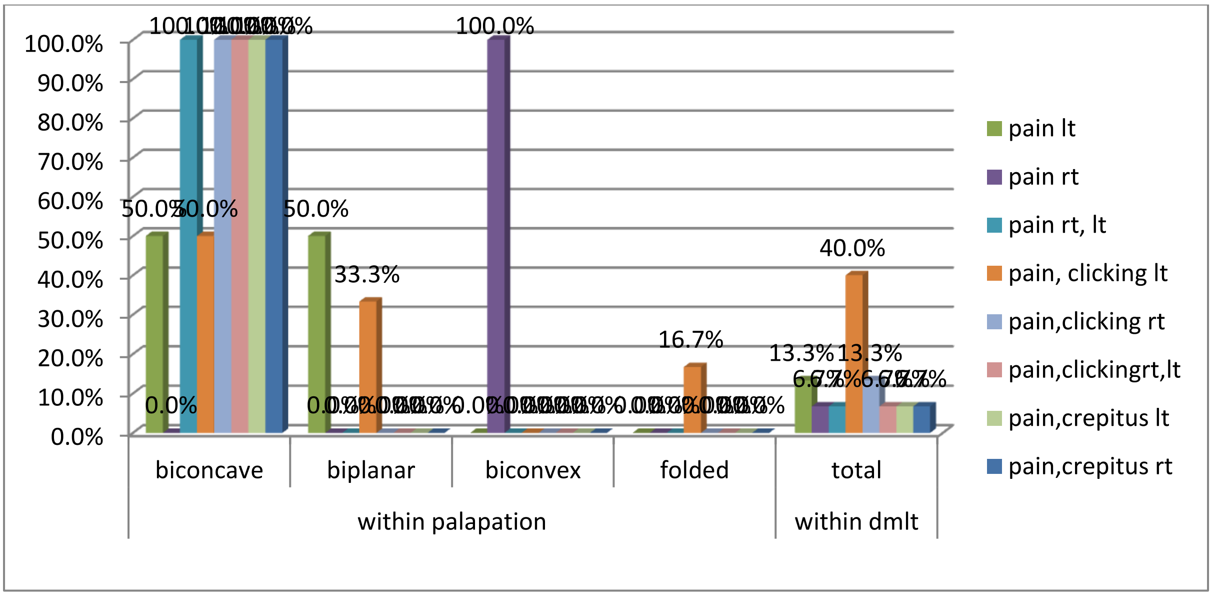
Graph-31: Correlation between palpation and AELT



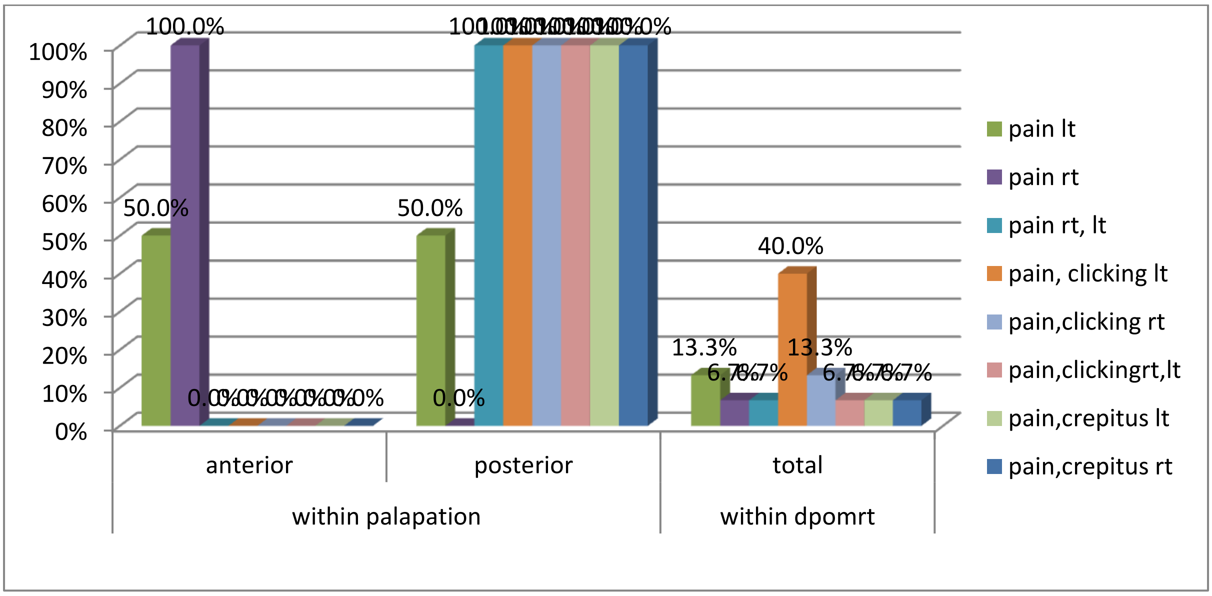
Graph-32: Correlation between palpation and DMRT



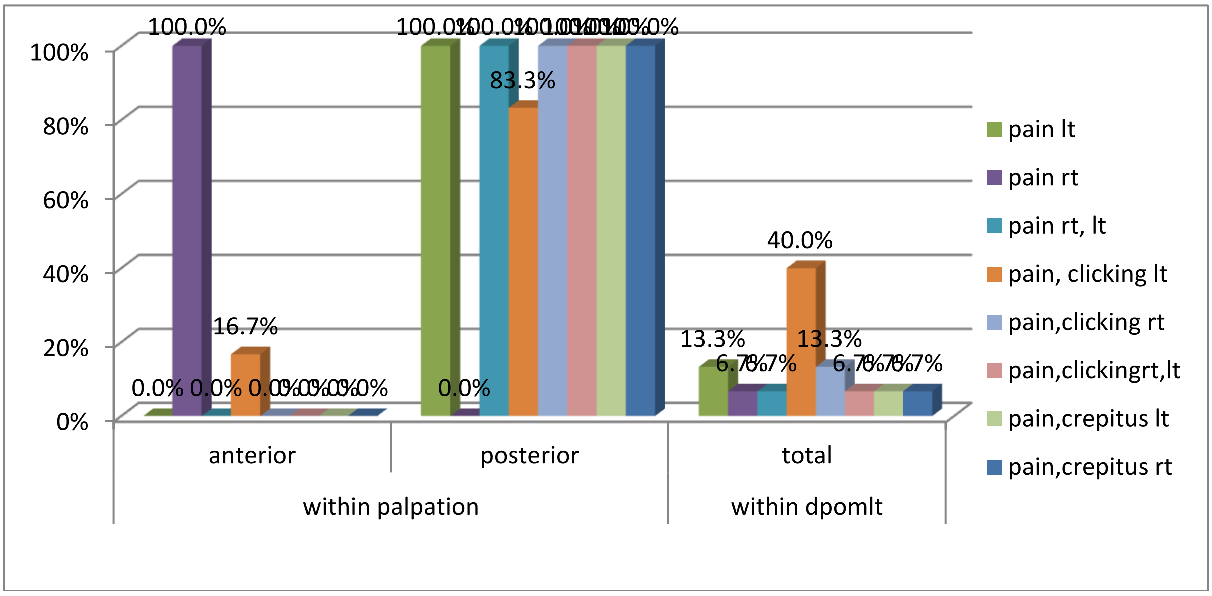
Graph-33: Correlation between palpation and DMRT



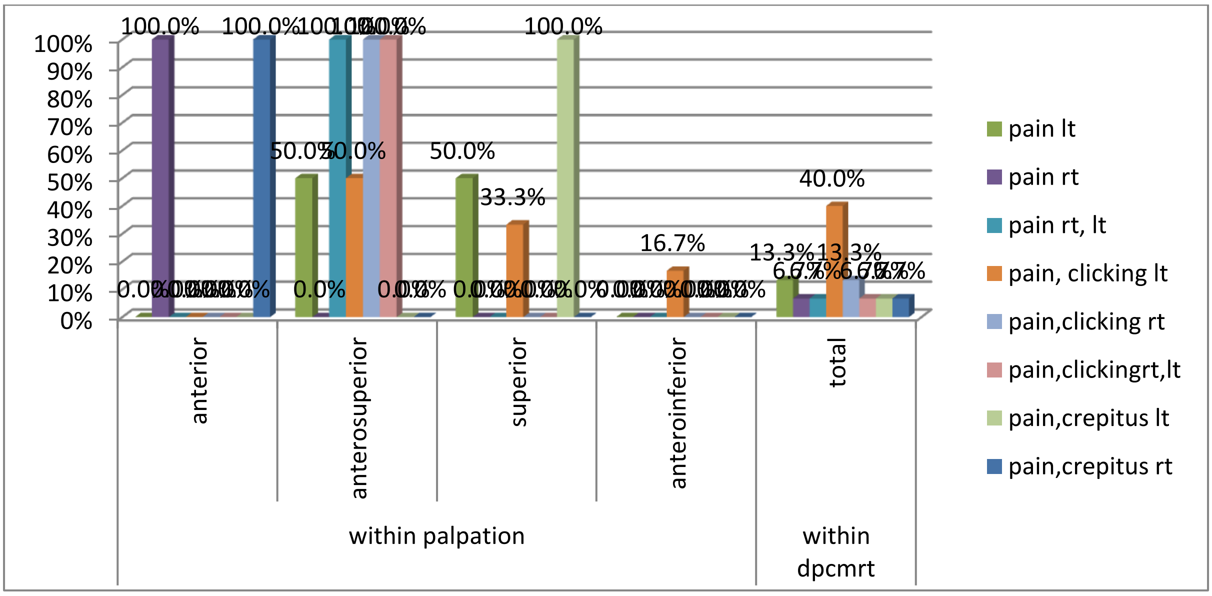
Graph-34: Correlation between palpation and DPOMRT



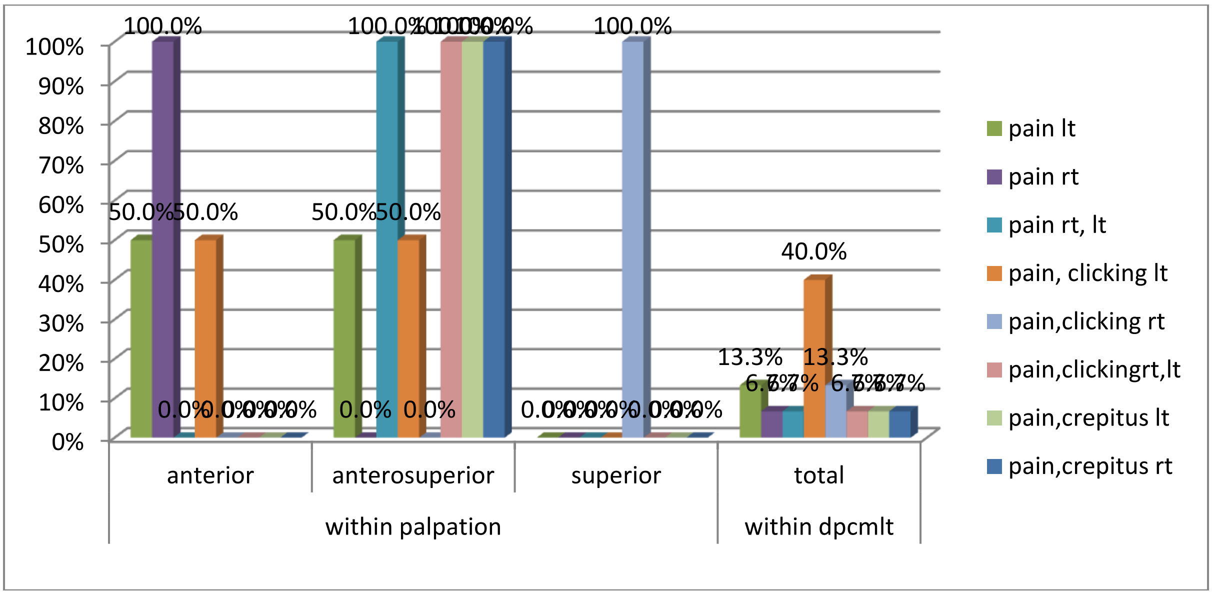
Graph-35: Correlation between palpation and DPOMLT



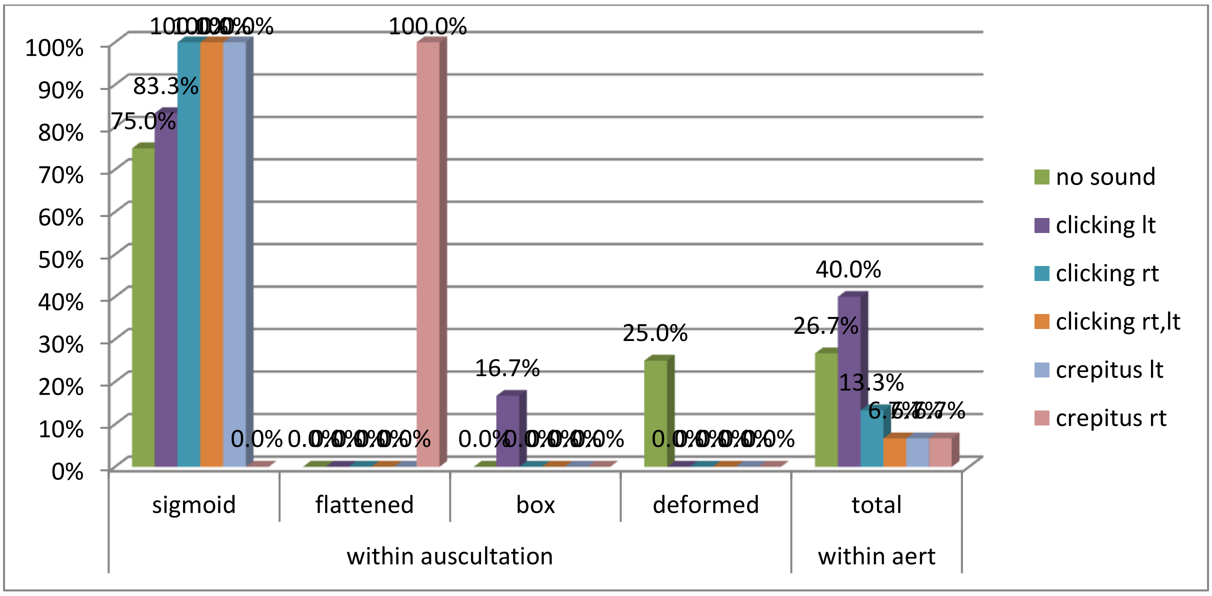
Graph-36: Correlation between palpation and DPCMRT



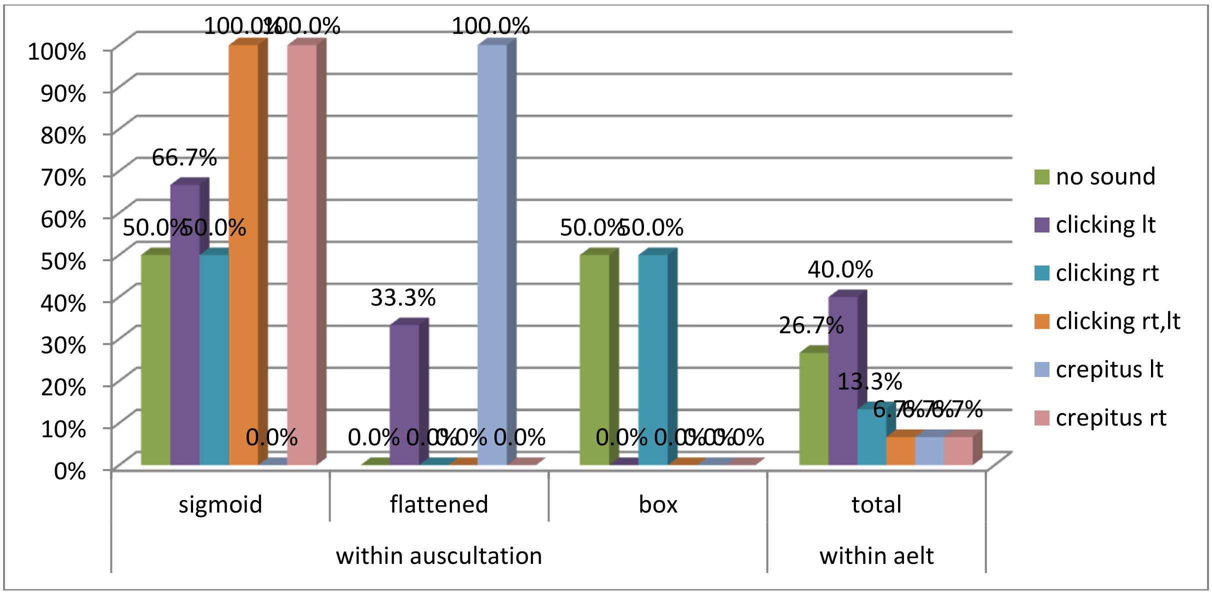
Graph-37: Correlation between palpation and DPCMLT



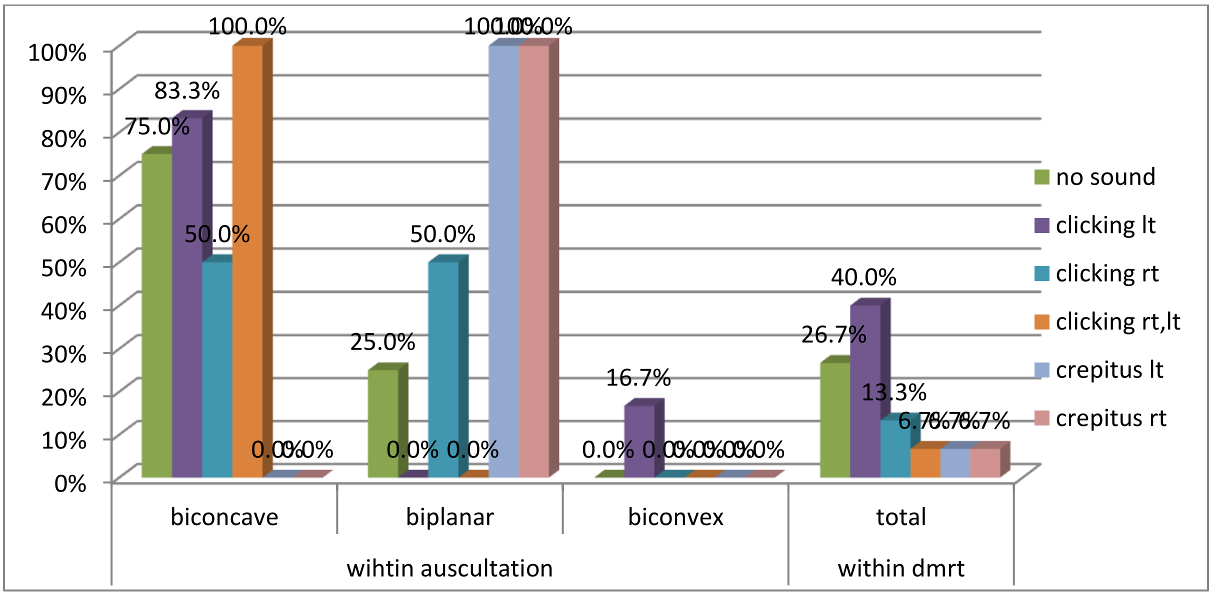
Graph-38: Correlation between auscultation and AERT



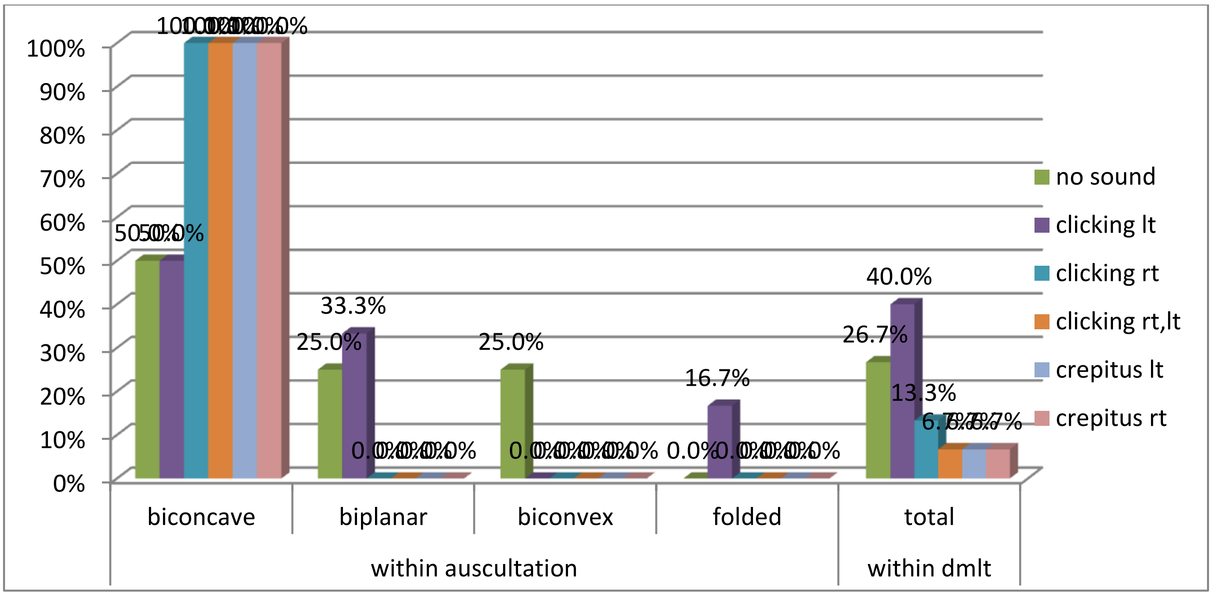
Graph-39: Correlation between auscultation and AELT



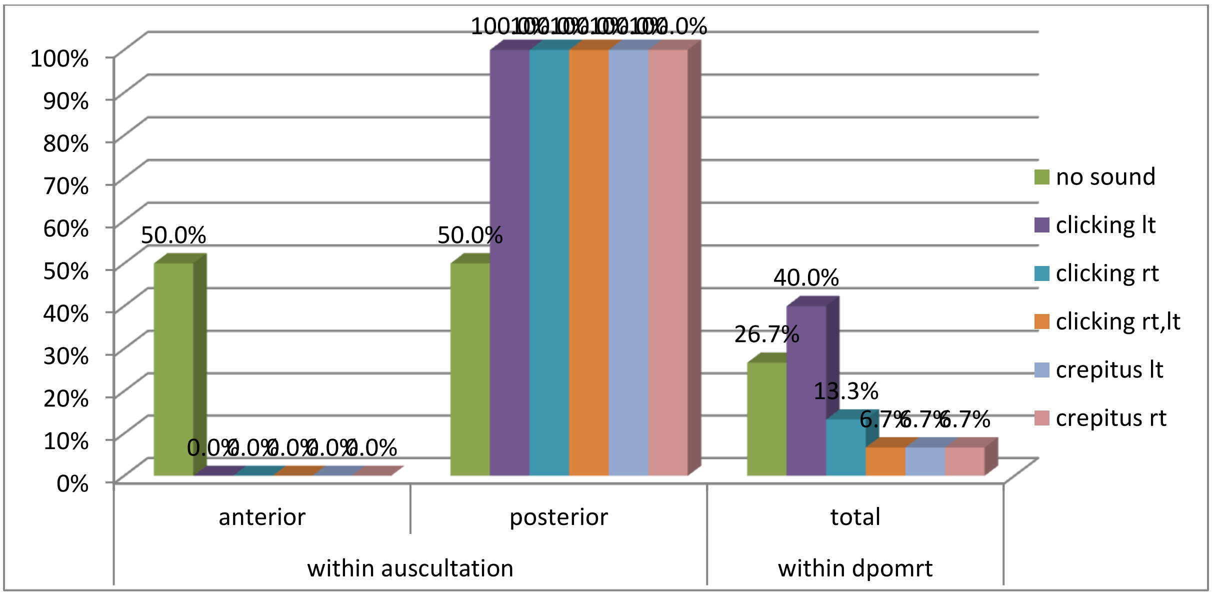
Graph-40: Correlation between auscultation and DMRT



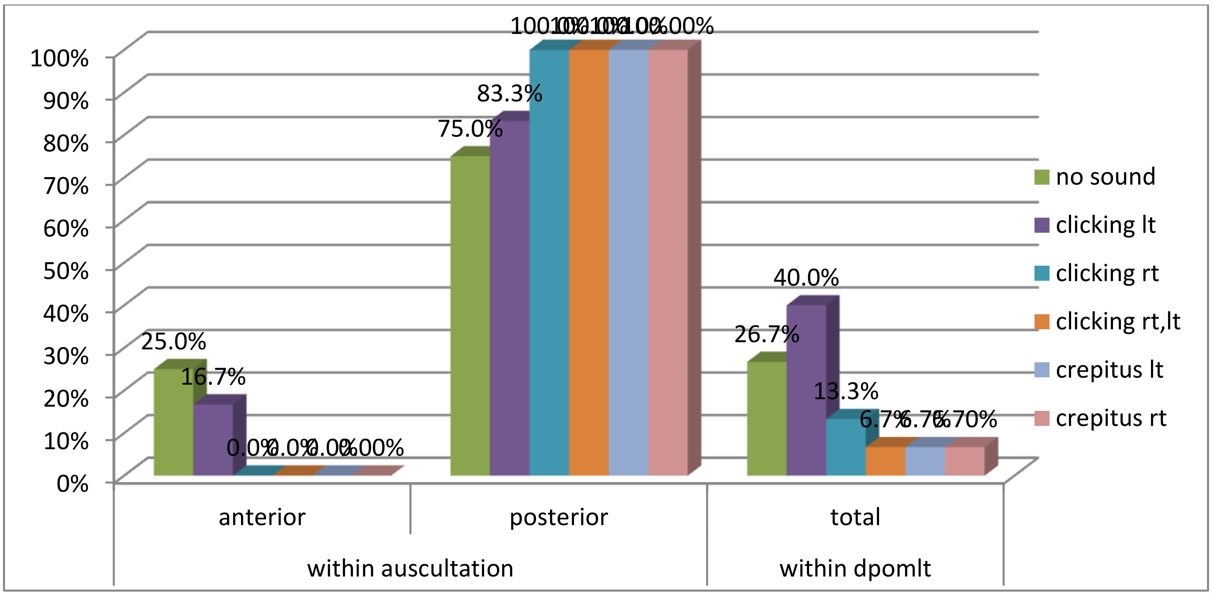
Graph-41: Correlation between auscultation and DMLT



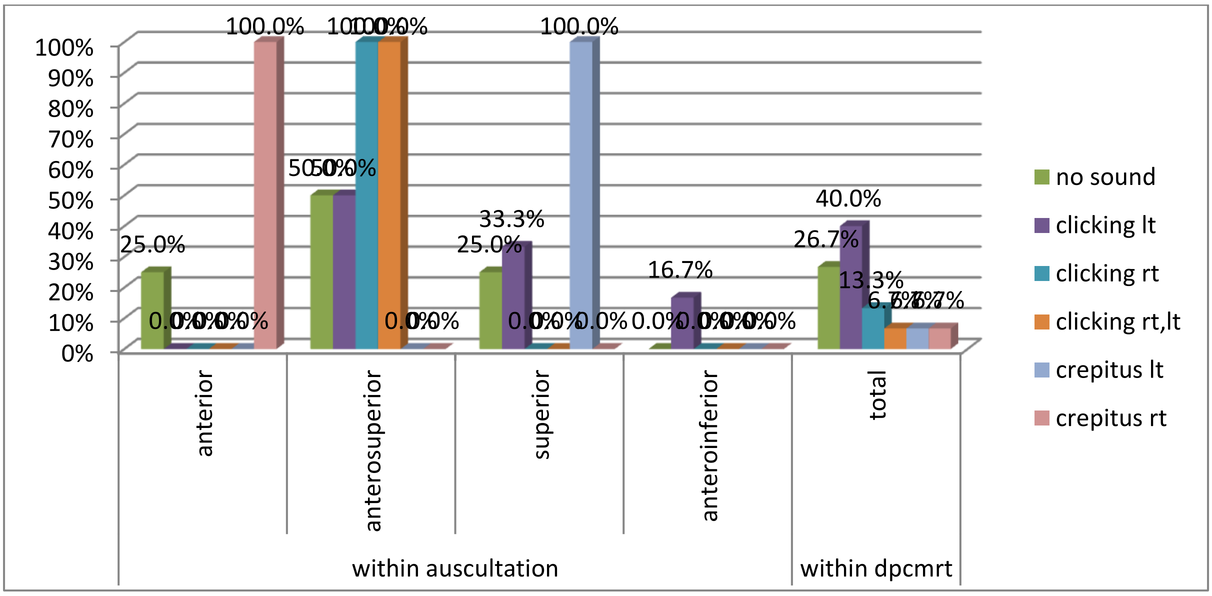
Graph-42: Correlation between auscultation and DPOMRT



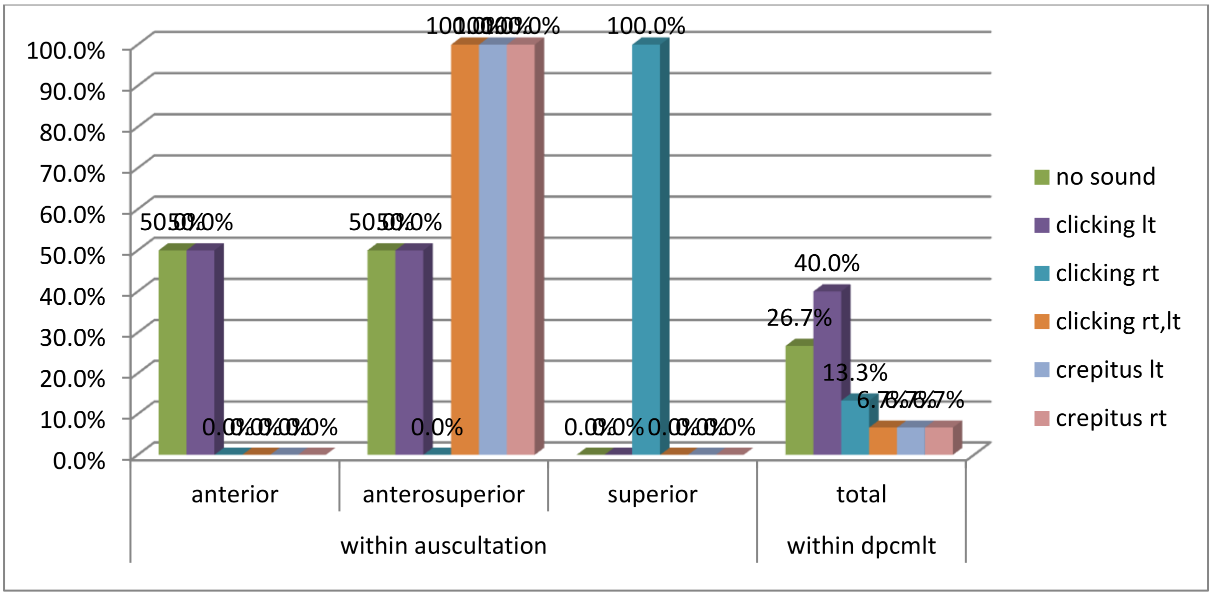
Graph-43: Correlation between auscultation and DPOMLT



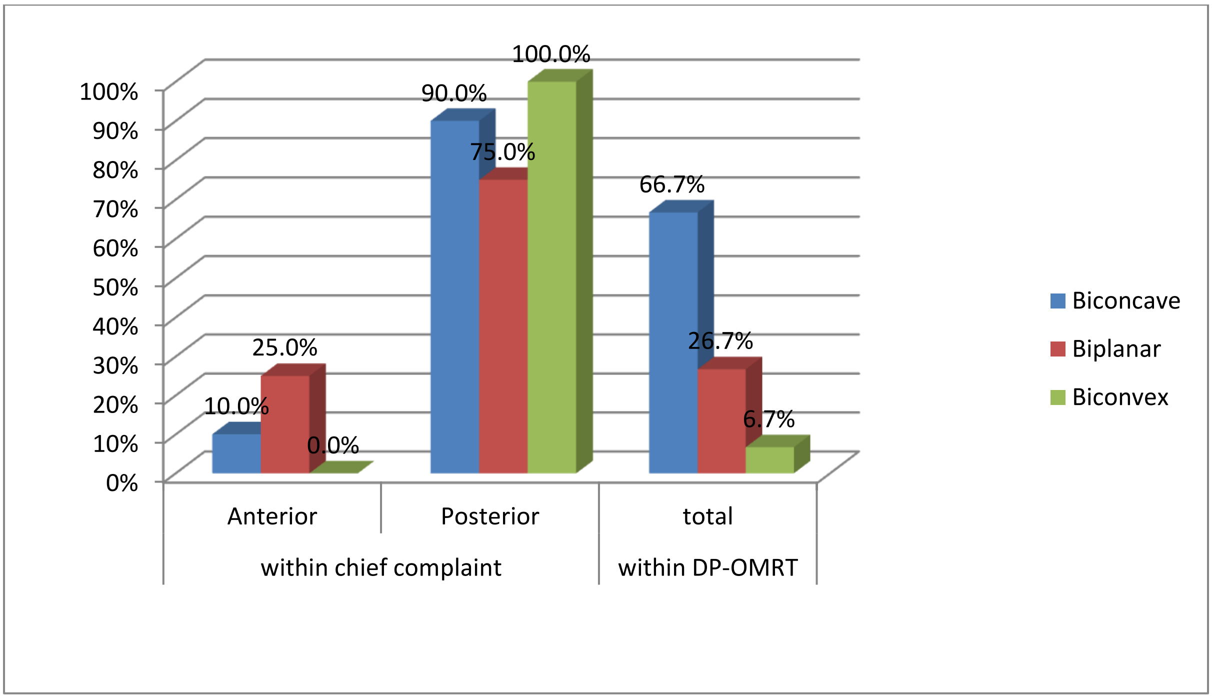
Graph-44: Correlation between auscultation and DPCMRT



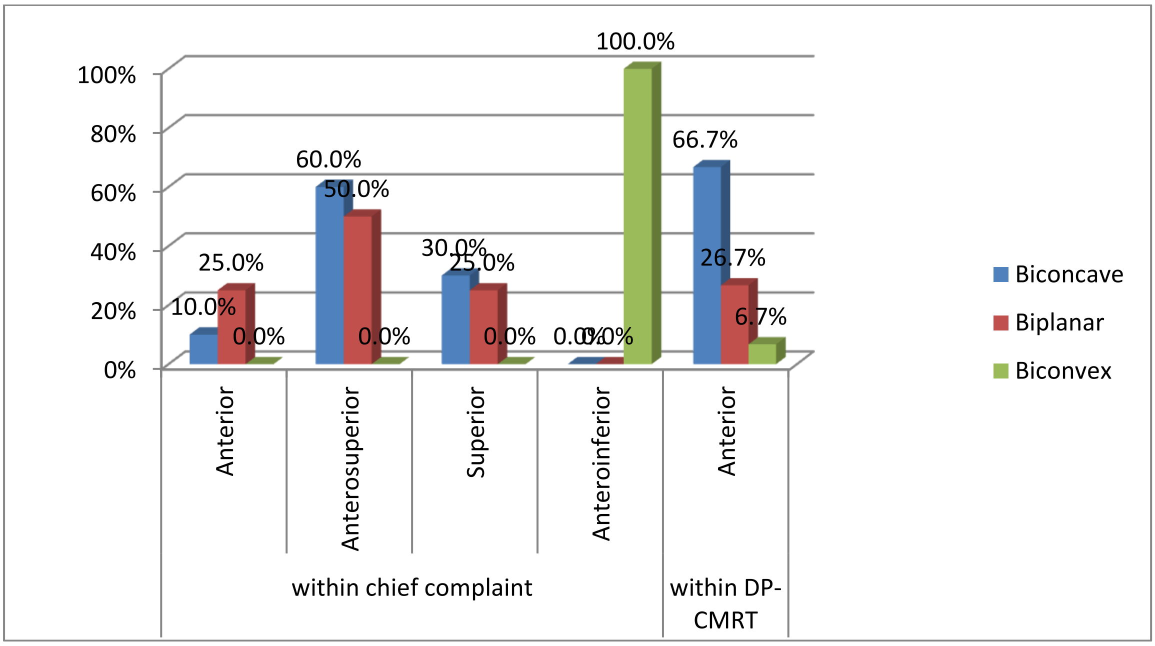
Graph-45: Correlation between auscultation and DPCMLT



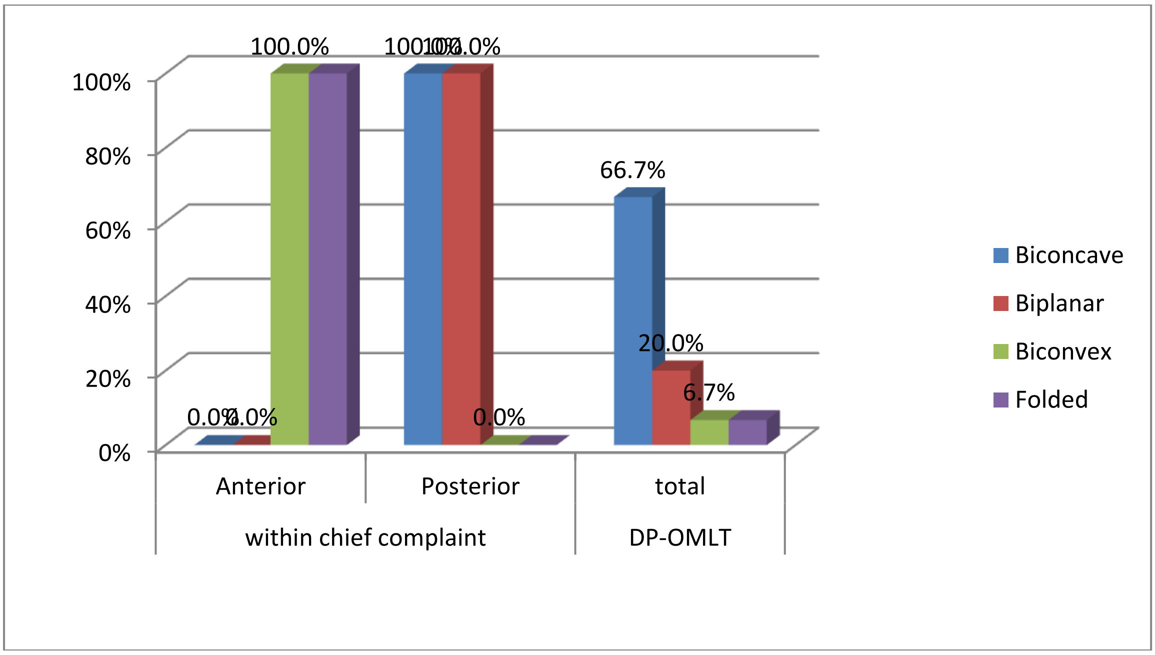
Graph-46: Correlation between DMRT and DPOMRT



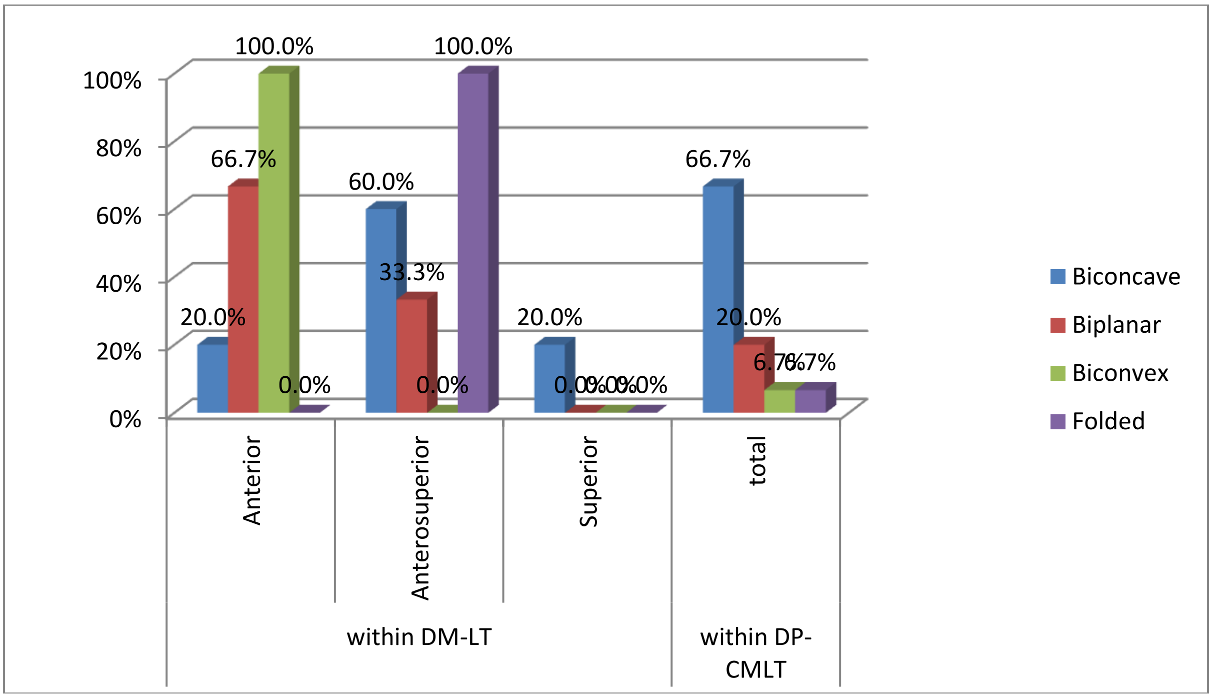
Graph-47: Correlation between DMRT and DPCMRT



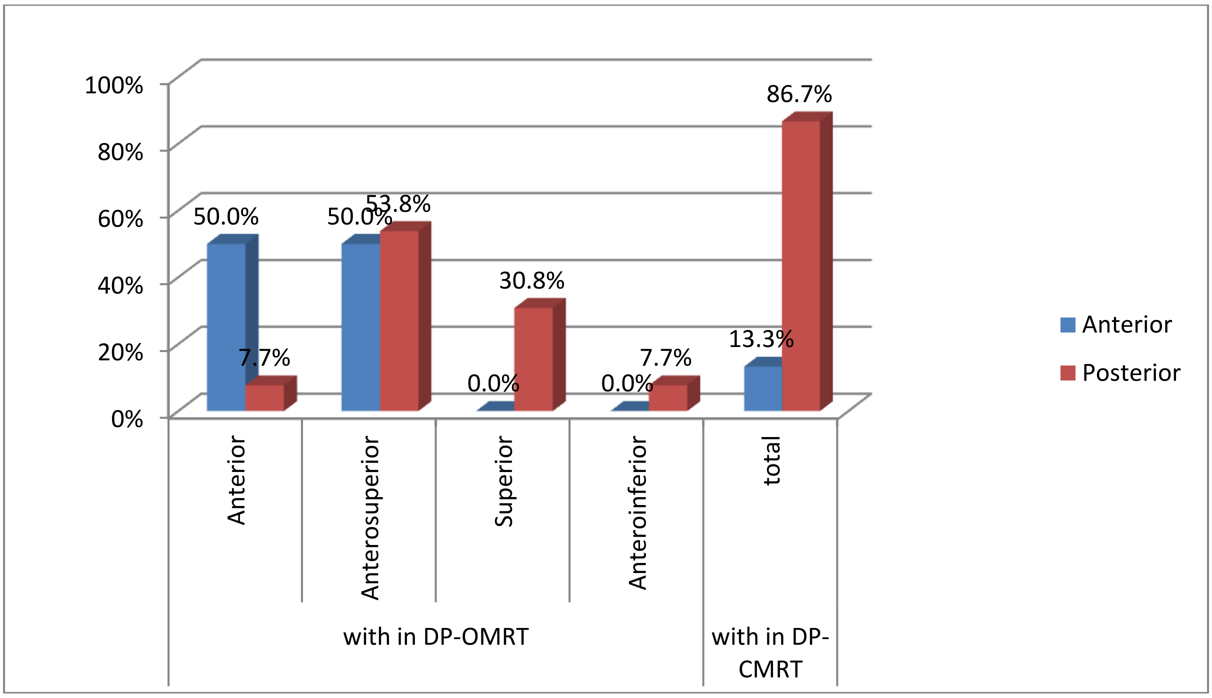
Graph-48: Correlation between DMLT and DPOMLT



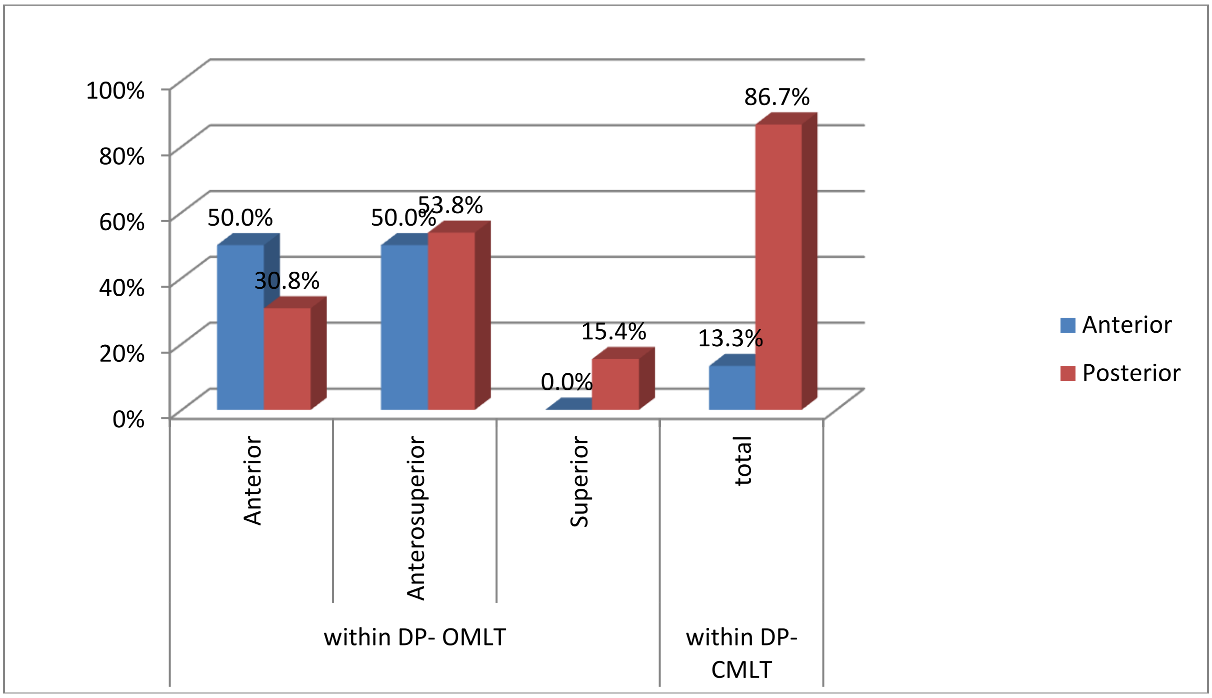
Graph-49: Correlation between DMLT and DPCMLT



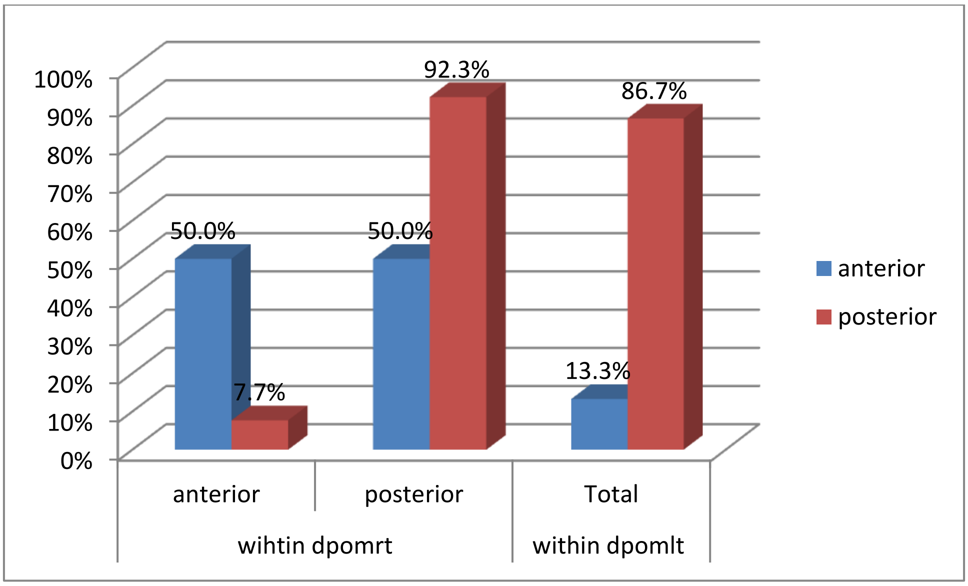
Graph-50: Correlation between DPOMRT and DPCMRT



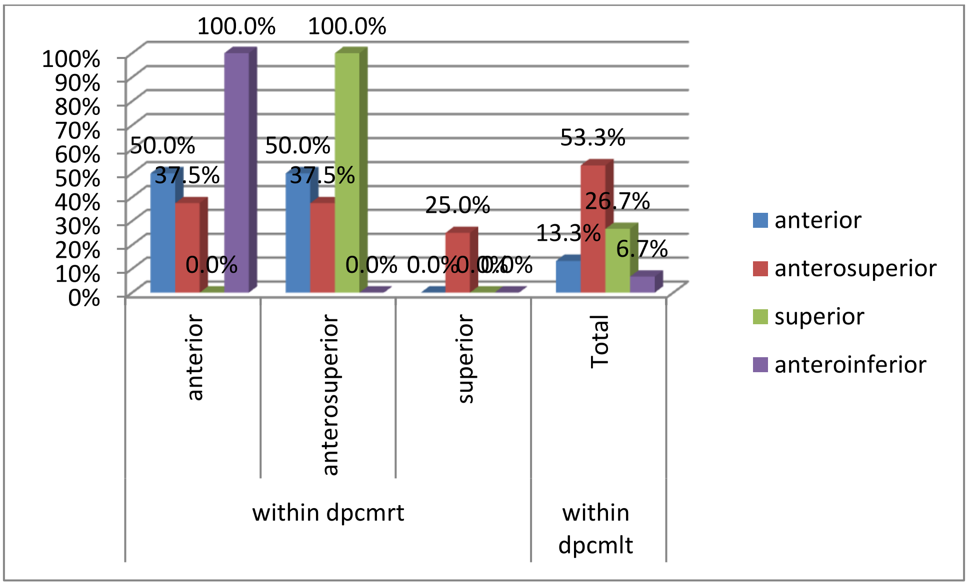
Graph-51: Correlation between DPOMLT and DPCMLT



Graph-52: Correlation between DPOMRT and DPOMLT



Graph-53: Correlation between DPCMRT and DPCMLT



Temporomandibular disorders (TMD) are defined as "a collective term embracing a number of clinical problems that involve the masticatory muscles, the temporomandibular joint and associated structures, or both". They are considered to be a subclassification of musculoskeletal disorders and typically run a recurrent or chronic course, with a substantial fluctuation of TMD signs and symptoms over time. Common signs and symptoms of TMD are clicking noises in the temporomandibular joint (TMJ), limited jaw opening capacity, deviations in the movement patterns of the mandible and masticatory muscle and/or TMJ pain in the face[2].

The structure and biochemical composition of contacting surface of TMJ may be altered by articular disk displacements. Disk deformation and/or perforation, atypical cellular architecture, osteophyte formation, subchondral bone resorption, disruption of the physical continuity of the articular surface of the mandibular condyle, and adhesion formation have all been observed in TMJs with articular disk displacement[3].

This study deals with radiological analysis of TMJ in MRI for evaluating articular disc morphology, position of articular disc in relation to condyle and articular eminence morphology. These findings are then correlated with patient's chief complaint and clinical findings.

This study was conducted between March 2012 to July 2012 in the department of Oral Medicine and Radiology of Ragas Dental College and Hospital, Saravana scans, Chennai.

A total number of 15 patients with symptomatic TMJ disorder were involved in the study.

Patients with TMJ changes due to developmental anamolies, age changes, trauma, infections, systemic diseases and tumours, patients with history of previous surgery in TMJ region and Patients with internal (implanted) defibrillator or pacemaker, cochlear (ear) implant, clips used on brain aneurysms, metal coils placed within blood vessels were excluded from the study.

In the total of 15 subjects involved in our study, the incidence of TMJ disorder was found to be more common in females than in males. Most of them had pain/clicking or both on the left side which may be related to predominant chewing habit. Deviation was present in 6 patients, which were all on the same side. On palpation, pain was commonly present in all the patients, and all other findings such as clicking and crepitus were consistent with their chief complaint. Auscultatory findings were consistent with the palpatory findings.

The broad discussion about the predisposing factors for the development of internal TMJ disorders led to the development of diverse models to assess the association of anatomical structures with these disorders. It was important to divide these structures into groups in order to compare both sides and have a functional view of the TMJ, considering that most studies did not take that into account.

For articular eminence shape criteria of Kurita *et al*.[67] was followed.

In this study, sigmoid shape was most commonly observed which was in accordance with Fabio Henrique Hirata et al.[67] One patient with the chief complaint of lock jaw had deformed shape on right side and box shape on left side. One patient with the chief complaint of pain in the left and one patient with clicking in right had box shape in the right side. Three patients with pain in the left had flattened shape in the left side. One patient with the pain and clicking in the right had flattened shape in the right side.

The box shape represents a larger articular eminence or a deeper articular fossa than found in the sigmoid and flattened shapes. The sigmoid shape is more likely to have a larger articular eminence or a deeper articular fossa in the articular eminence than the flattened shape. The flattened shape is the shallowest.

For disc configuration and position, the criteria of **Murakami *et al*.** [67] was followed.

In this study, biconcave shape was found predominantly which was in accordance with Fabio Henrique Hirata et al.[67] One patient who had lock jaw had biconvex shape in the left side. One patient with clicking in the left had folded shape in the left side. Out of three patients who had pain in the left side, two had biplanar shape in right side and one had biplanar shape in left side. One patient with clicking in the right and one patient with pain and clicking in the right had biplanar shape in the right side. One patient with clicking in the left had biconvex shape right and biplanar in the left side.

On examining the disc position in open mouth in MRI, posterior position was most common. One patient who had lock jaw had anterior position in both right and left side. One patient with clicking in the left had anterior position in left side. While one patient with pain in the left, had anterior position in right side.

On examining the disc position in close mouth in MRI, anterosuperior was the most common position followed by superior. Patients who had anterior position in open mouth had anterior position in close mouth both on right and left side. One patient who had posterior position in open mouth, had antero inferior in close mouth.

Though we have correlated numerous clinical and radiographic features like age, sex, chief complaint, duration, mouth opening, deviation, palpation, auscultation, articular eminence morphology, disc morphology and disc position in the above given sample size we couldn’t staunchly correlate articular disc morphology and position in MRI for patients with temperomandibular joint disorder which may be due to smaller sample size. Hence further exploration in the above topic is required with larger sample size.

Temporomandibular joint disorder, as suggested by Bell, are considered to be a subclassification of musculoskeletal disorders, and typically run a recurrent or chronic course, with a substantial fluctuation of TMD signs and symptoms over time.

Etiopathogenesis of TMD was considered intially as a single cause but later turned out to be multifactorial. This complex joint which has structure and biochemical composition requires more exploration to identify and understand the cause and effect relation. Hence this study is framed to correlate the clinical characteristics of TMD patients with disc morphology and position using an advanced imaging modality, the MRI.

The study was conducted between March 2012 and July 2012 in our department taking a total number of 15 symptomatic TMD patients.

The results showed a female preponderance predominately on the left side with deviation and clicking which were confirmed with palpation and auscultation.

The morphological variability of articular eminence were of the following types, sigmoid, flattened, box, deformed, among which sigmoid was the most common morphology found.

The morphological variability of articular disc were of the following types, biconcave, biconvex, biplanar, hemiconvex and folded, among which biconcave was the most common morphology found.

The disc position in open mouth was categorized as anterior position and posterior position, among which posterior position was predominantly found.

The disc position in close mouth was categorized as anterior, anterosuperior, anteroinferior, superior, among which anterosuperior position was predominantly found.

To conclude, though we have correlated numerous clinical and radiographic features we couldn’t conclude any particular clinical feature with radiographic feature which may be due to smaller sample size. Hence further exploration in the above topic is required with larger sample size.

TMD is a multifactorial disorder which has various clinical and radiological characterizations. Accurate diagnosis of the patho-etiology behind the production of TMD symptoms will result in improved treatment results. Early identification of arthrogenous disorders coupled with more accurate delivery of therapy may serve to prevent the progression of temporomandibular joint degradation and stem the development of resultant chronic pain presentations.

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S. No	Age	Sex	Chief Complaint	Duration (Months)	Mouth Opening (mm)	Deviation	Palpation	Auscultation	AE RT	AE LT	DM RT	DM LT	Disc position open Mouth		Disc position close Mouth	
													RT	Lt	RT	LT
1	32	F	Lock jaw	60	35	Right	Pain Right	No Sound	Deformed	Box	Biconcave	Bicovex	Anterior	Anterior	Anterior	Anterior
2	19	F	Pain Left	6	38	Deviation to left	pain & clicking left	Clicking left	sigmoid	sigmoid	Biconcave	Biconcave	Posterior	Posterier	Superior	Antero superior
3	18	F	Pain left	4	40	Absent	pain clicking left	crepitus left	sigmoid	flattened	biplanar	Biconcave	Posterior	Posterier	Superior	Antero superior
4	23	F	clicking left	10	44	left	pain & clicking left	Clicking left	sigmoid	sigmoid	Biconcave	Folded	Posterior	Anterior	antero - superior	Antero superior
5	27	M	Pain left	18	38	Absent	Pain left	No Sound	sigmoid	Box	biplonar	Biconcave	Anterior	Posterier	antero - superior	anterior
6	28	M	Pain left	24	42	absent	pain clicking left	Clicking left	sigmoid	sigmoid	Biconcave	Biconcave	Posterior	Posterier	Suporior	antero - superior
7	46	F	Pain left	36	35	Absent	pain clicking left	Clicking left	sigmoid	flattened	Biconcave	biplonar	Posterior	Posterior	antero - superior	Anterior
8	46	F	Pain left	24	36	Absent	pain clicking left	Clicking left	sigmoid	flattened	Biconcave	Biconcave	Posterior	Posterior	antero - superior	Anterior
9	19	F	clicking left	6	44	left	pain clicking left	Clicking left	sigmoid	Box	biplonar	Biconcave	Posterior	Posterior	antero - superior	superior
10	23	F	clicking left	12	38	Absent	pain clicking left	Clicking left	sigmoid	sigmoid	Biconcave	Biconcave	Posterior	Posterior	antero - superior	antero - superior
11	27	F	clicking left	30	42	Absent	pain clicking left	Clicking left	Box	sigmoid	Biconcave	biplonar	Posterior	Posterior	antero - superior	Anterior
12	26	M	Pain left	12	44	Absent	Pain left	No Sound	sigmoid	sigmoid	Biconcave	biplonar	Posterior	Posterior	Superior	antero - superior
13	20	F	clicking left	6	45	Absent	pain clicking left	Clicking life	sigmoid	sigmoid	Biconcave	Biconcave	Posterior	Posterior	antero - superior	superior
14	35	F	pain right & Left	12	41	right	pain right & left	No Sound	sigmoid	sigmoid	Biconcave	Biconcave	Posterior	Posterior	antero - superior	antero - superior
15	30	F	clicking left	12	42	left	pain clicking left	crepitus left	flattened	sigmoid	biplonar	Biconcave	Posterior	Posterior	Anterior	antero - superior

RAGAS DENTAL COLLEGE AND HOSPITALS

Department of Oral Medicine Diagnosis and Radiology

CASE SHEET PROFOMA

Clinical correlation of articular disc morphology and position in MRI for patients with temperomandibular joint disorder: A Prospective study

Serial No. OP No: Date :

Name: Age/ Sex:

Address :

Chief complaint with duration :

TMJ Examination data :

Pain / Tenderness :

- Character :
- Duration :
- Frequency:
- Functional disruption :

Mouth opening :

Deviation :

Palpation :

Auscultation:

<u>Articular disc configuration</u> :

[

Biconcave	Biplanar	Biconvex	Hemiconvex	Folded

<u>Articular disc Position</u> :(Open mouth)

Anterior	Posterior

<u>Articular disc Position</u> :(Close mouth)

“a” (superior)	“b” (anterosuperior)	“c” (anterior)	“d” (anteroinferior)

<u>Articular eminence morphology</u> :

Box	Sigmoid	Flattened	Deformed

CONSENT LETTER

I ____________________, the under signed hereby give my consent for the performance of taking MRI on myself for the study titled Clinical correlation of articular disc morphology and position in **MRI** for patients with temperomandibular joint disorder, conducted by **Dr. R. Subha**, under the guidance of **Dr. S. Manoj Kumar, MDS,** Professor, Department of Oral Medicine and Radiology, Ragas Dental College and Hospital, Chennai. I have been informed and explained about the evaluation procedure, risk involved and likelihood of successes. I also understand and accept this as a part of study protocol, thereby voluntarily, unconditionally freely give my consent without any fear or pressure in mentally sound, conscious state to participate in the study.

Witness/Representative	Patient Signature
(If any)	Date:

ஒப்புதல் படிவம்

நான் என்னுடைய முழு ஒத்துழைப்பை மருத்துவர் **இரா. சுபா** அவர்கள் நடத்தும் தாடை மூட்டு பகுதியை **MRI** மூலம் கண்டறிதல் என்ற ஆராய்ச்சி கட்டுரைக்கு வழி நடத்தும் மருத்துவர் **எஸ். மனோஜ் குமார்** பேராசிரியர் வாய் மருத்துவம், நோய் அறிதல் மற்றும் ஊடுகதிர் பிரிவு, ராகாஸ் பல் மருத்துவமனை, அவர்களுக்கு அளிக்கிறேன். ஆய்வின் பற்றிய தன்மையும், அதைச் சார்ந்த நடத்தும் பரிசோதனைக்கும், அதனால் ஏற்படும் பின்விளைவுகள் மற்றும் அதன் முக்கியத்துவத்தையும் எனக்கு விளக்கிக் கூறப்பட்டது. இதை அறிந்து செயல்முறையை முழுவதும் நடத்தி முடிக்க நானாக வேறொருவர்தூண்டுதல் இன்றி முழு சுயநினைவோடு எந்த வித அச்சமும் இன்றி இந்த ஆய்வுக்கு பூரண ஒத்துழைப்பு அளிக்க ஓப்புதல் அளிக்கின்றேன்.

தேதி : **கையொப்பம்**